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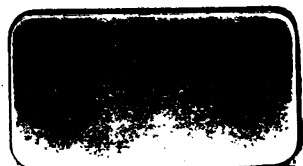
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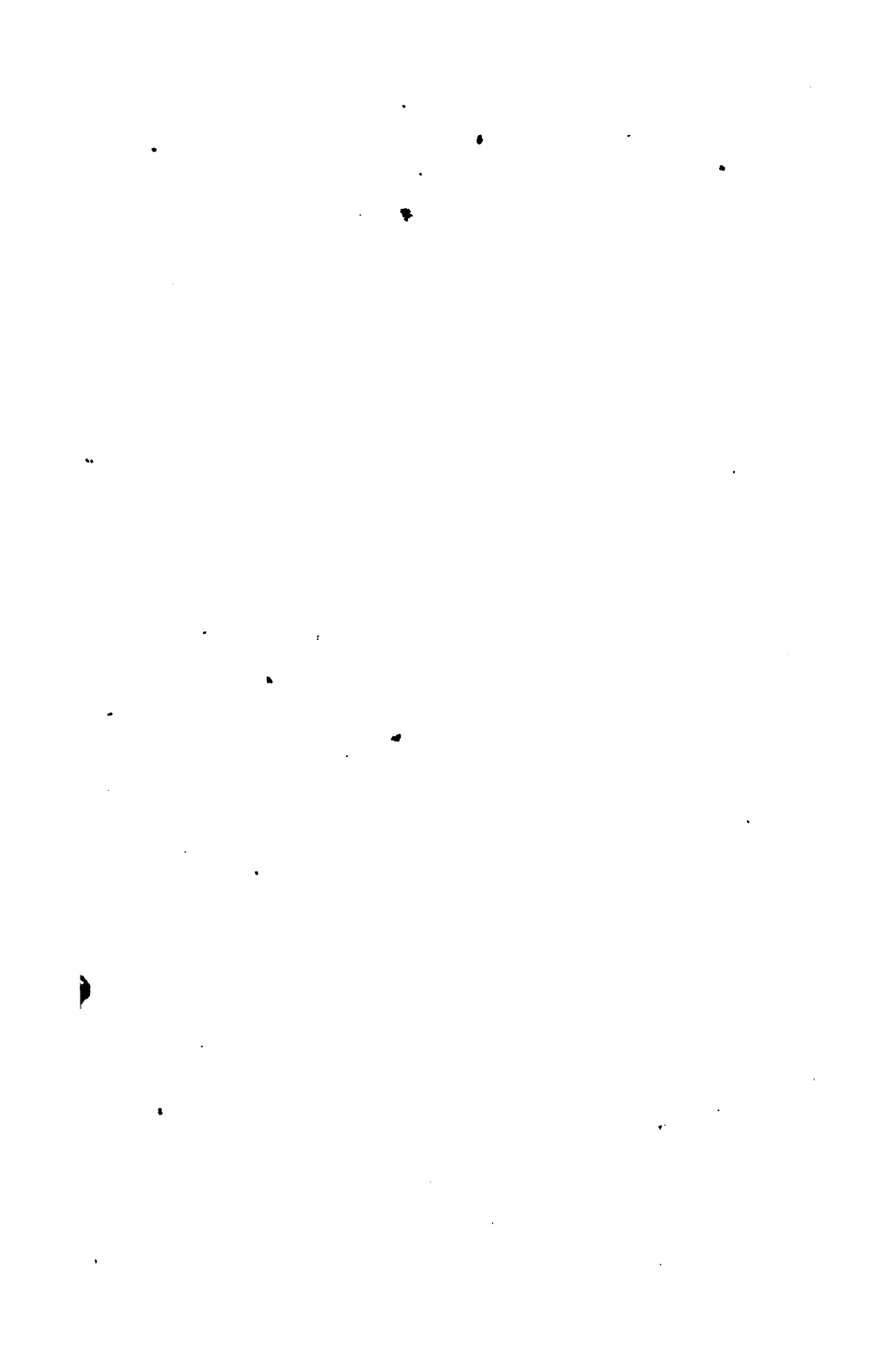
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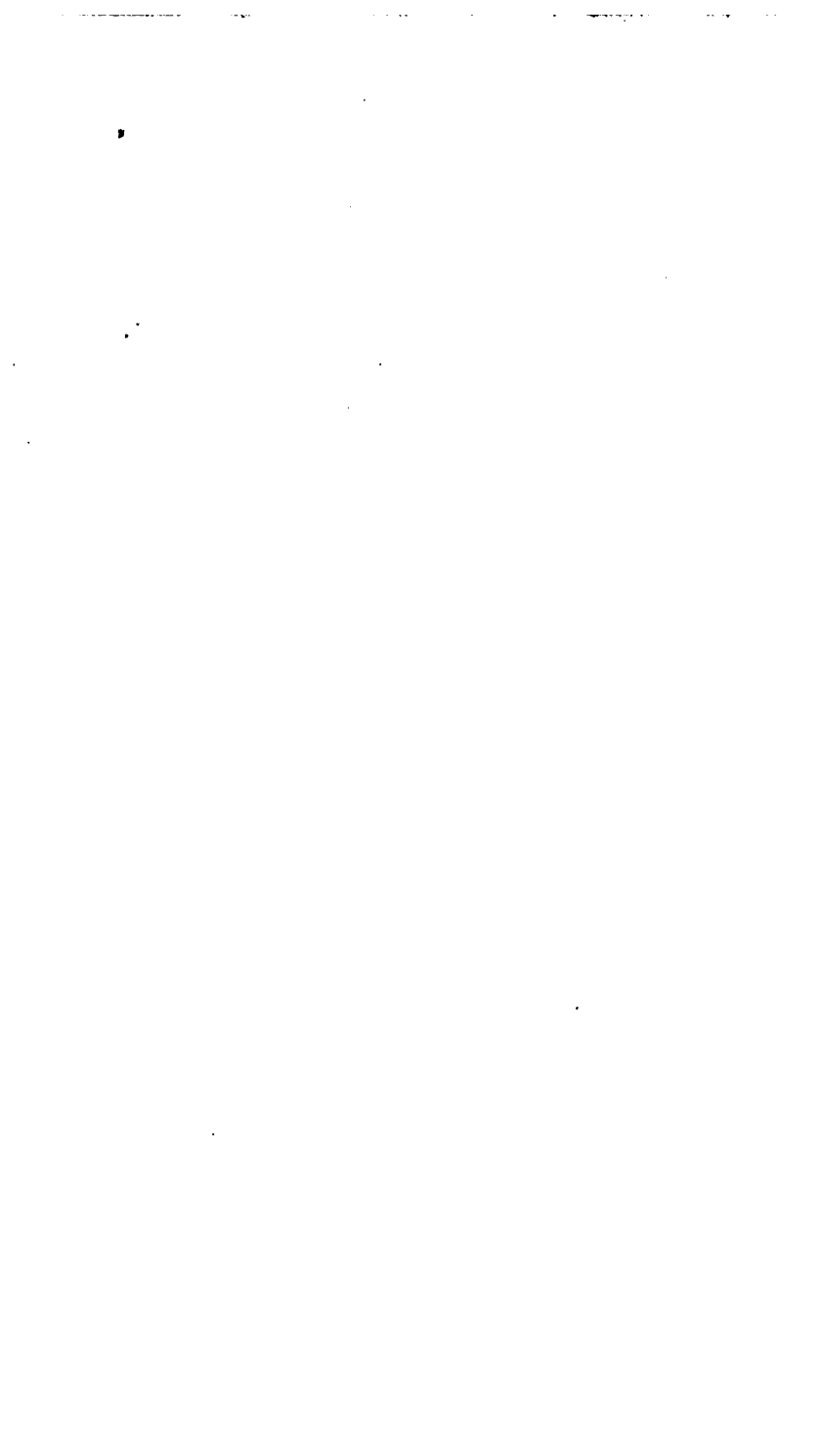


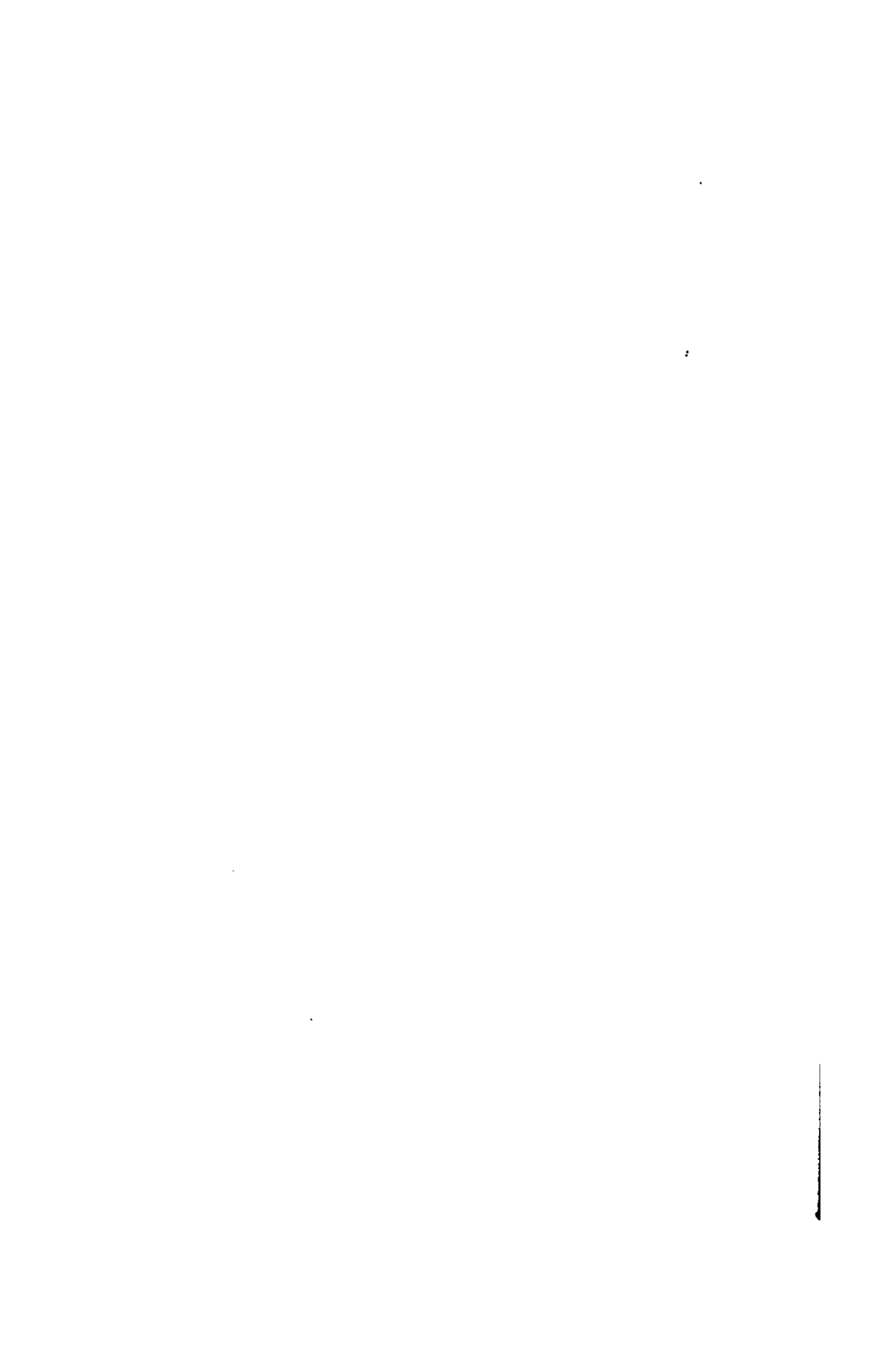




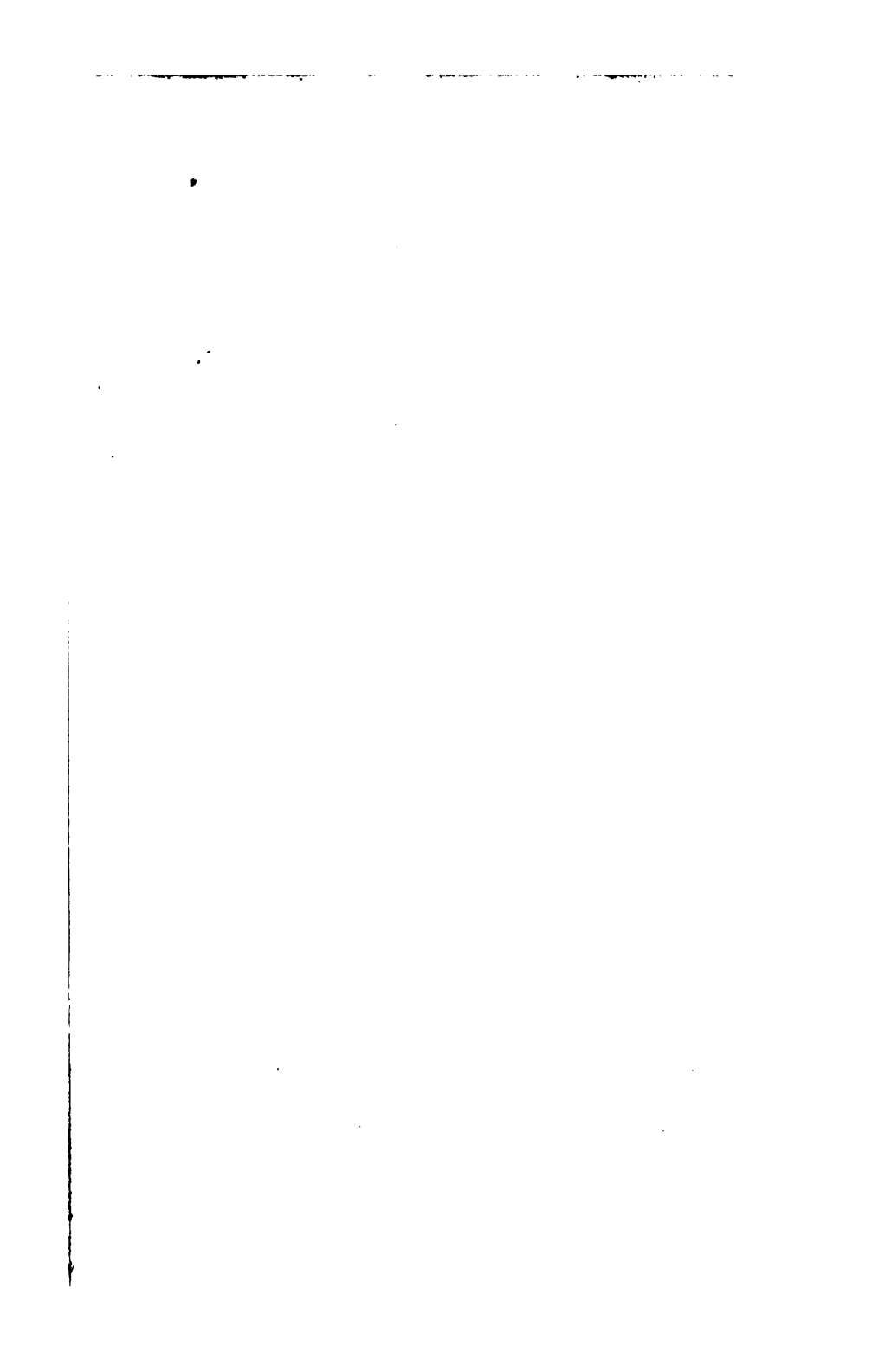


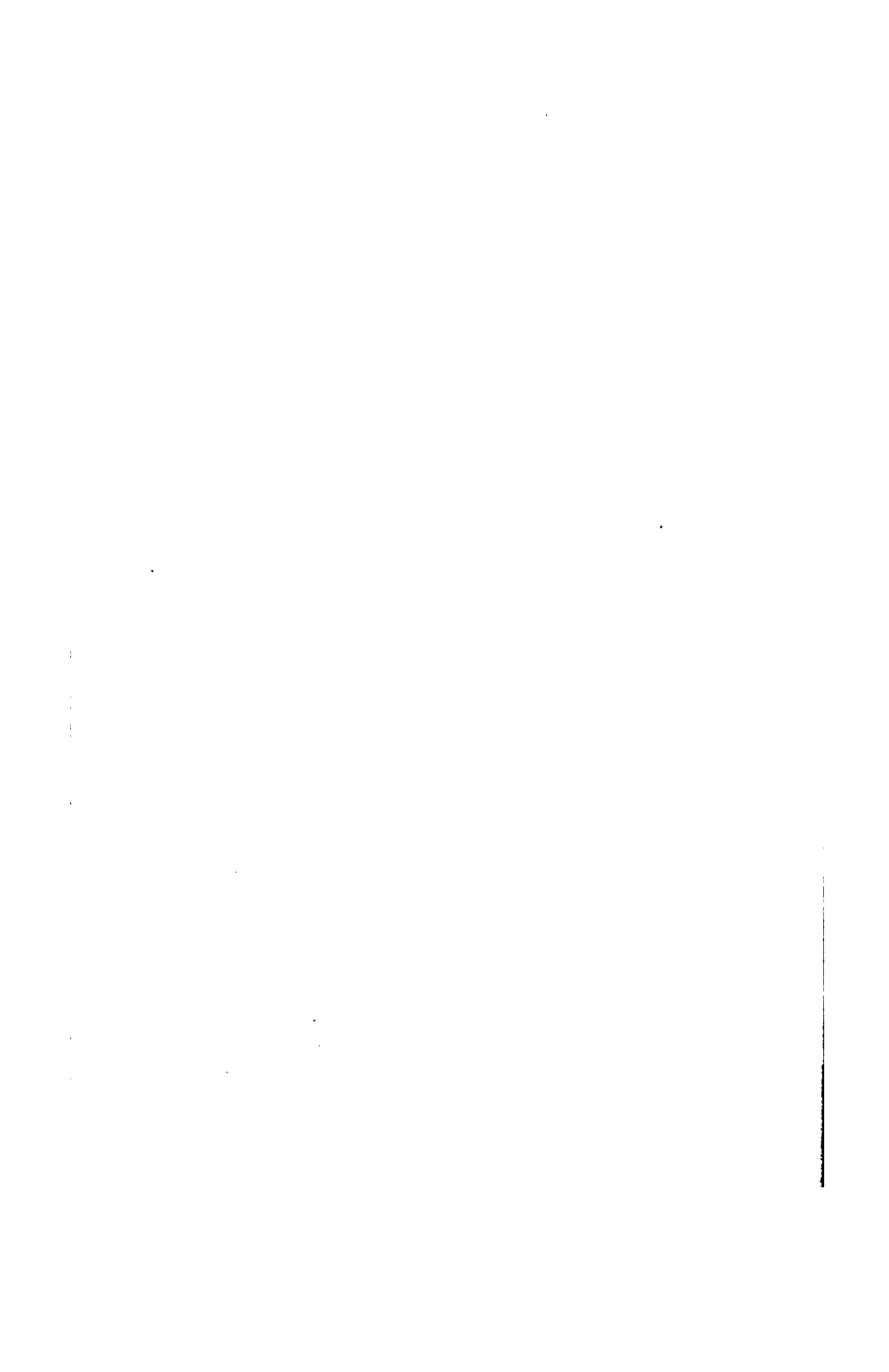


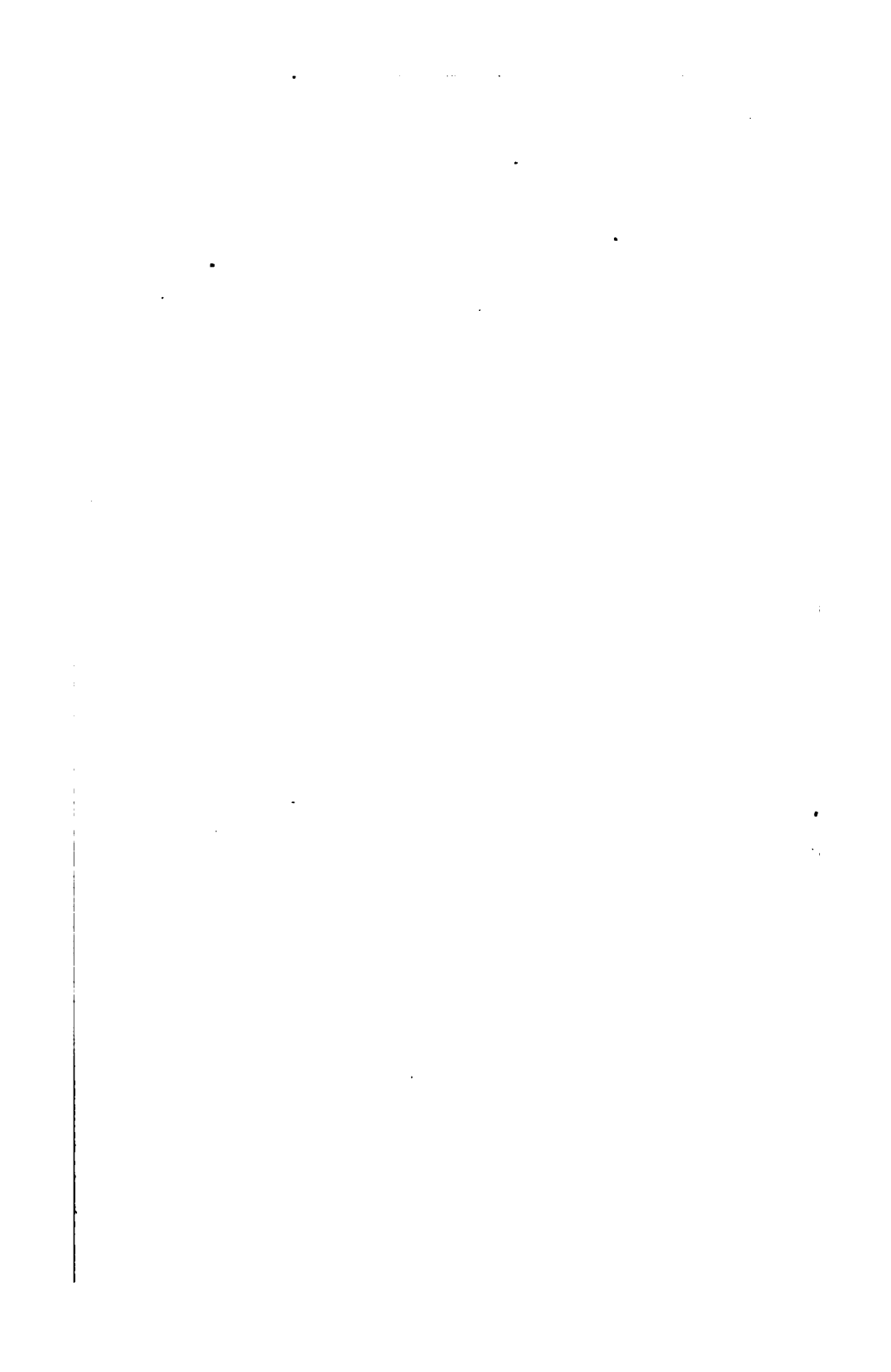












ON THE
HARROGATE SPAS,

AND

CHANGE OF AIR;

EXHIBITING

A MEDICAL COMMENTARY ON THE WATERS,

FOUNDED

ON PROFESSOR HOFMANN'S ANALYSIS.

BY

G. W. ROYSTON PIGOTT, M.A., M.D., CANTAB.,

LATE FELLOW OF ST. PETER'S COLLEGE, CAMBRIDGE, AND MEMBER
OF THE ROYAL COLLEGE OF PHYSICIANS, LONDON.



FOURTH EDITION.

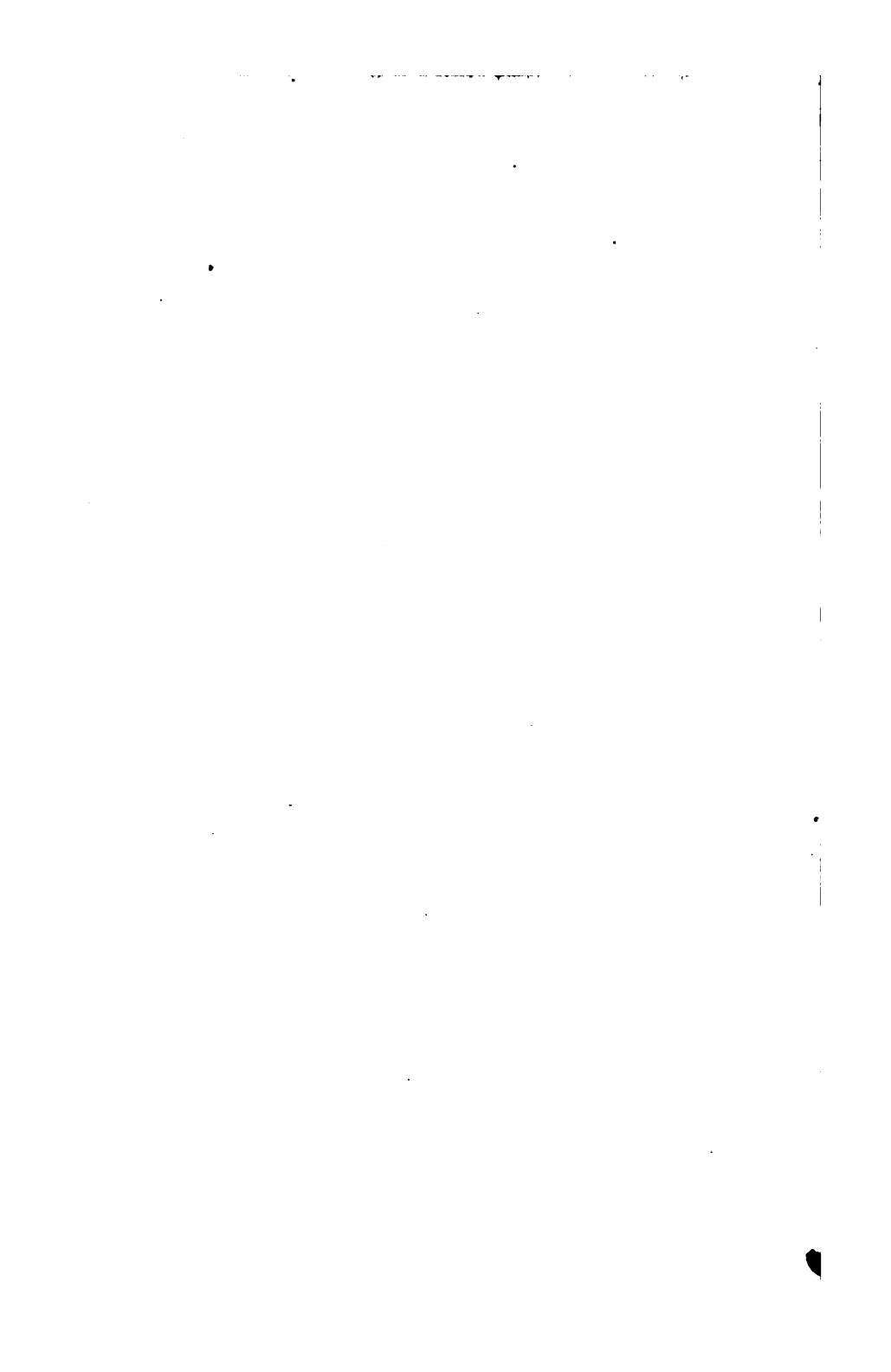
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
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PREFACE.

"By chemic art, your healing qualities
I too may boast to know ; and whence derived,
From earths, or salts, or mineral particles
Combined, suspended by attraction's laws,
Or held in union by aerial chains,
And crown'd by sprightly gas."

NOTWITHSTANDING the favorable reception of the early editions of 'THE HARROGATE SPAS,' in the last edition I ventured to entirely recast the subject-matter of the work, which was indeed almost rewritten.

To blend the historical and descriptive ; to glance at the lovely landscapes, and prominent objects of natural and artistic beauty in the neighbourhood ; to present the reader with the evidence which, during many years, has gradually strengthened my convictions of the real efficacy of the Harrogate waters,—exceeding, as they do, in number and variety, all others assembled in one spot,—and to warn him against their injudicious use :—such are the principal objects of the work.

He will find that the special, and indeed the celebrated, action of the waters upon that all-important organ, the human skin, is one of the best explanations of their beneficial effects upon the general health. Accordingly, I have here attempted to demonstrate the peculiar influences of atmospheric changes—of air, weather, damp, and cold,—telling upon a debilitated skin; to describe the insidious effects of *obstructed perspiration*; and to infer the great advantages to the constitution, obtainable, in an enfeebled state of the skin, from improving its varied functions, by bathing, and drinking the waters.

The action of the Harrogate Spas upon the blood, the nerves, and the secretions, have next occupied my attention; and lastly, as they seemed more likely to prove useful than abstract descriptions, I have introduced a number of cases illustrative of skin disorders.

G. W. ROYSTON FIGOTT;

July 3rd, 1865.

11, STANLEY TERRACE, .

NOTTING HILL, W.; AND

CLARE HOUSE, HALIFAX.

CONTENTS.

PART I.

HISTORICAL AND DESCRIPTIVE.

CHAPTER I.

	PAGE
HISTORICAL AND INTRODUCTORY.—Ancient celebrity of Mineral Spas.—Roman Customs	1
Baie and its waters.—Renown of Spas.—Origin and gradual development of Harrogate	18

CHAPTER II.

LOCAL SCENERY.—Advantages of attractive scenery to invalids	19
Descriptions of the Environs of Harrogate.—View from the Telescope Observatory	20

CHAPTER III.

A FEW WORDS ON HARROGATE.—General sketch, and peculiarity of the Air	26
Verdict of an eminent writer upon Harrogate	29

CHAPTER IV.

THE WATERS OF HARROGATE.—The various springs in use	34
---------------------------------------------------------------	----

PART II.

ON AIR, WEATHER, BATHING, &c.

CHAPTER I.

CHANGE OF AIR	45
The effects of impure air.—The influence of changes of weather on the general health, in a debilitated state of the skin	47

CHAPTER II.

	PAGE
DEBILITY OF THE SKIN AND ITS INSIDIOUS INFLUENCE, IN A CHANGEABLE CLIMATE, UPON THE GENERAL HEALTH . . .	64
Debility of the Skin, though a diseased state, is not always a <i>visible</i> skin disorder.—General influence of the skin on in- ternal organs.—Explanation of the effects of cold bathing, in a debilitated state of the skin.—The value of the REACTION . . .	68
Common causes and results of the debility in question . . .	80
Endowments of the Skin.—Sympathetic influences . . .	83

CHAPTER III.

DEBILITY OF THE SKIN AS CONNECTED WITH OBSTRUCTED PER- SPIRATION	87
Disastrous consequences of obstructed perspiration in plants as well as man	90
Glandular torpor of the skin.—Vapour baths.—TUBERCLE . . .	95
CASE I.—Severe chronic bronchitis	96
Examples of checked perspiration	97
CASE II.—Pyrosis	98
CASE III.—Nettle rash, tic douloureux, and nervous headache . .	99
CASE IV. Severe headache	101

CHAPTER IV.

BATHS AND BATHING	102
Hot, warm, tepid, cold, vapour and douche baths	104

CHAPTER V.

COUNTER BATHING.—Description of extreme debility of the skin.— Principles of applying baths.—Customs of various Nations as regards the use of <i>transition baths</i>	122
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----

PART III.

AN INQUIRY INTO THE MEDICINAL CHARACTERS OF THE HARROGATE WATERS.

CHAPTER I.

PRINCIPLES OF INVESTIGATION.—The waters have powerful medi- cinal effects, apart from the change of air	131
----------------------------------------------------------------------------------------------------------------------	-----

CONTENTS.

vii

	PAGE
They contain ingredients native to the blood in health, and these ingredients have a variety of constitutional effects when taken separately.—BLOOD MEDICATION.	135
Consideration of the NATURAL GROUPS formed by the association of the various remedies.—General suggestions derivable from the known action of each.—Uses of common salt, or chloride of sodium	139

CHAPTER II.

THE MEDICINAL CHARACTERS OF THE CHLORIDES OF POTASSIUM, MAGNESIUM, CALCIUM, &c.

Chloride of potassium	145
Chloride of magnesium	150
Chloride of calcium	153
Chloride of calcium is essentially a blood remedy	155
Rickets, spinal distortions, and scrofula	156
Sulphide of sodium	164
Action of sulphuretted hydrogen	165
Summary of the argument	169

PART IV.

THE MEDICINAL USES OF THE WATERS.

CHAPTER I.

CHALYBEATE WATERS and their general properties	173
----------------------------------------------------------	-----

CHAPTER II.

IMPERIAL CHALYBEATE SALINE.—General properties	180
Play of the passions	186
Struma and glandular obstruction	187
CASE V.—Overworked nervous system, secretory torpor, and blood disorder	192
Disorders of the spleen.—Kala Nimuk	193
Torpor of the liver	195
Atonic indigestion	197
Eruptions of the face, periodic derangements—Spinal irritation	200

CHAPTER III.

MONTPELIER SALINE CHALYBEATE.

	PAGE
Comparison with Homburg and other Foreign springs	202
General uses in abdominal plethora, mesenteric obstruction, mucous dyspepsia, induration of liver, &c.	204
CASE VI.—Induration of liver	208

CHAPTER IV.

THE STRONG SULPHUREOUS WATERS.

Comparison with Foreign Waters.— <i>Indigestion</i> , mucous dyspepsia.—	
Weak digestion	214
Nervous dyspepsia.—Bilious affections	229
Abuse of mercury	236
CASE VIII.—Jaundice of three months' duration	237
Congestion and Plethora.—Droopy.—Systemic Indigestion.—Co-	
lonic Indigestion, from excessive use of purgatives	239
Intestinal Torpor.—Causes	248
Rheumatism and Gout	250
Nervine Disorders.—CASE IX.—Epilepsy	252
CASE X.—Sciatica and Neuralgia	253
ERUPTIONS OF THE SKIN.—Illustrative Cases XI-XXI	254—257

CHAPTER V.

MILD SULPHUREOUS WATERS.

CHAPTER VI.

ON CONSTITUTIONAL INFLUENCE, REGIMEN, AND DIET	271
----------------------------------------------------------	-----

CHAPTER VII.

ON THE ADMINISTRATION OF THE WATERS	276
-----------------------------------------------	-----

APPENDIX.

PROFESSOR HOFMANN'S ANALYSIS.

THE HARROGATE SPAS.

PART I.

HISTORICAL AND DESCRIPTIVE.

THE HARROGATE SPAS.

CHAPTER I.

HISTORICAL AND INTRODUCTORY.

THE experience of mankind has, from the earliest times, been steadily in favour of the use of natural medicinal springs. Instinct is the same in all ages, because it is the voice of Nature. The practice of bathing must have been coeval with the earliest times of human existence. The curiosity natural to man would soon lead him to experiment upon the properties of various natural springs ; and, whether revealed by research or by accident, he would quickly conceive the idea of such springs possessing a medicinal influence. But as mankind have ever been prone to ascribe the unknown to supernatural causes, the multitude would naturally adopt the belief of presiding deities. In ancient times, medicinal springs were therefore dedicated to the gods fabled by a designing priesthood. Nations flocked to the most celebrated fountains, while a mysterious and pompous ceremonial irresistibly enthralled the imagination of the credulous, and diverted their attentive regard from the independent virtues of the spring. Hence charms, amulets, incantations and prayers, disguised the medicine, while they captivated the heart of the people.

It was the privileged priests alone who could propitiate these divine agencies. To them the sick resorted for relief. Under penalty of death they enforced the treatment of disease according to the established customs recorded within their temples. A new malady could not be treated for which the records made no provision. The victim, left to the force of Nature, flew to his charms, and in case of restoration, ascribed his recovery to their supernatural efficacy. The spirit of inquiry was systematically denounced and effectually extinguished.

The practice of bathing doubtless preceded that of drinking mineral waters, but the early history of the two is inseparable. When Circe entertains Ulysses in her palace, a bath is prepared for his reception, after which he is anointed with costly perfumes and robed in magnificent attire. The bath was the first refreshment offered to a distinguished guest.

“Now, from nocturnal sweat and sanguine stain,
They cleanse their bodies in the neighbouring main;
Then in the polished bath, refreshed from toil,
Their joints they supple with dissolving oil:
In due repast indulge the genial hour,
And first to Pallas their libations pour;
They sit, rejoicing in her aid divine,
And the crown'd goblet foams with floods of wine.”

The Iliad. (Pope.)

The strongest motives of human nature, as well as a peculiar training by exercise and the bath, were brought into play by the ancients, for the purpose of developing the physical and mental qualities of the masses. To be a victor at the olympic games, according to Cicero, was considered almost more glorious than a triumph at Rome. A competition—in which

even kings did not disdain to engage—in which the conquerors were said to be equal to the gods, and in honour of whom statues, not only to themselves, but sometimes even to their horses, were erected in the woods encompassing the temple of Jupiter—a competition for such mighty distinctions could not fail to exercise all the ingenuity and wisdom of the age for their attainment. Success was final. The victors were maintained at the public expense during the remainder of their lives. Hence an immense multitude of people, not only from all Greece, but from most remote countries, assembled to witness the celebration of these games. Works of genius were there exhibited. It was there that Herodotus rehearsed his history—where the boy Thucydides wept at its recital and formed the acquaintance of the great historian.

The training of the aspirants to these divine honours in the olympic games was gradually perfected during centuries of experience and investigation. *Bathing* and *inunction* were indispensable to their *athletic* exercises, which, it is said, were instituted 776 years before the Christian era.

Bathing establishments were attached at first only to the gymnasia or training-schools of the Olympic games. Subsequently the Romans, at the height of their luxury, imitated the Greeks and built magnificent public baths, not only at home, but wherever they carried their victorious arms. The remains of these Roman works, still magnificent in ruins, excite a just admiration of this sagacious policy. The Roman soldier surpassed all others in hardihood and prowess, owing to this spirited combination of systematic *bathing* with athletic exercises.

“Hence the limbs,
Knit into force; and the same *Roman* arm,
That rose victorious o’er the conquered earth,
First learned, while tender, to subdue the wave.
Even from the body’s purity, the mind
Derives a secret sympathetic aid.”

But although the Greeks generally regarded their hot springs as presents from their gods, to whom they dedicated them in consequence of their invigorating virtues—yet some of the ancient philosophers ventured upon a different explanation of their effects—as Aristotle, who ascribed them to impregnations with copper, gold, sulphur, bitumen, and nitre; whilst the priesthod of paganism long retained a tenacious claim to the treatment of disease, which in no small degree sustained their popular influence. Internal diseases were supposed to be inflicted by an angry demon. This idea, in various parts of the uncivilised world, from the frozen wilds of North America to the torrid climes of South Africa, still prevails. Superstition and the love of the marvellous, amid the glory of conquest and the wisdom of the senate, long enchanted the Roman people. “Fear, gratitude, and curiosity, a dream, rare omen, a singular disorder, a distant journey, perpetually disposed the devout polytheist to multiply the articles of his belief and to enlarge the list of his protectors. The deities of a thousand groves and a thousand streams possessed in peace their local and respective influence; nor could the Roman, who deprecated the wrath of the Tiber, deride the Egyptian, who presented his offering to the beneficent genius of the Nile. The Greek, the Roman, and the Barbarian, as they met before their respective altars, easily persuaded themselves that, under various names and with various

ceremonies, they adored the same deities; the elegant mythology of Homer gave a beautiful and almost a regular form to the polytheism of the ancient world. Rome gradually became the common temple of her subjects, and the freedom of the city was bestowed on all the gods of mankind."

At this period the English mineral waters were known in Rome; "the spirit of improvement had passed the Alps and been felt even in the woods of Britain, which were gradually cleared away to open a free space for convenient and elegant habitations. York was the seat of government, London enriched with commerce, and Bath was celebrated for the salutary effects of its medicinal waters." Roman ruins denoting the site of ancient baths have also been discovered at Buxton and Aldborough.

Rome, two thousand years ago, had its *Baïæ*, its *Velia*, and *Salernum*, the former on the hot and the latter on the cold water systems, and when the one failed the Romans sought the other just as people do now. We are indebted for the celebration of these waters to Horace, who, in consequence of an acrid discharge from his eyes, was recommended by the new cold-water doctor, Antonius Musa, to repair to the very cold waters of Velia and Salernum, the warm waters of Baïæ being thought prejudicial. Horace, in prospect of undergoing this new regimen, thus expresses himself to his friend Vala, in his 15th epistle, with all the fastidiousness and curiosity of a modern Spa visitor:—

"Dear Vala, say how temperate, how severe,
Are Velia's winters and Salernum's air,
The genius of the folks, the roads, how good;
Which eats the better bread, and when a flood
Of rain descends, which quaffs the gathered shower;
Or do their fountains purer water pour?"

At sea-port towns I shall expect to find
 My wines of generous and smoother kind;
 With flowing language to inspire my tongue,
 And make the listening fair one think me young.
 With hares or boars, which country's best supplied?
 Which seas their better fish luxurious hide?
 That I may home return in luscious plight,
 'Tis ours to credit, as 'tis yours to write."

It is recorded that Antonius Musa had the happiness of curing Augustus Cæsar of a chronic disease of the liver which his other physicians thought desperate; a cure which exalted the profession of physic from a state of contempt. The prince and the people contended in honouring a man who had restored a life so valuable to the state. Such glorious distinction was not confined to him alone, but extended to all the profession. The disciples of Hippocrates, the father of medicine, were then first allowed the privileges and immunities of a Roman citizen. *The cold bath* was now prescribed for all disorders. But the same prescription which had cured Augustus having unhappily killed Marcellus, the whole body of physicians were degraded to their former state of contempt.*

But that the use of mineral waters,† and particularly of sulphur waters, is of very great antiquity, may be gathered from the poet already quoted, who thus writes in allusion to the change in the fashion of bathing:—

"By my physician's learn'd advice, I fly
 From Baïæ's waters: yet with angry eye
 The village views me, when I mean to bathe,
 The middle winter's freezing wave beneath;
 Loudly complaining, that their myrtle groves
 Are now neglected, *Sulphureous* *Stoves*‡
Of ancient fame, our feeble nerves to raise

* Dio., lib. 53; Suet. oct., cap. 69 et 81.

† There were other kinds of mineral springs at Baïæ, mentioned by Pliny.

‡ Horace uses the word *Sulfura*, which means sulphur springs.

And dissipate the lingering cold disease ;
 While the sick folks in Clusium's fountains dare
 Plunge the bold head, or seek a colder air.
 The road we now must alter, and engage
 Th' unwilling horse to pass his usual stage,
 Ho ! whither now, his angry rider cries,
 And to the left the restive bridle plies,
 We go no more to Bain——”

The sulphur waters of Baiæ, bubbling forth very near the lake of Avernus, were said to cure the *articular disease* (rheumatism or gout) and restore motion and use to the nerves and joints. Even before the time of Cæsar, Baiæ was the place where the rich Romans thought themselves entitled to lay aside the restraints of republican hypocrisy, and to give themselves up to the pleasures and voluptuousness which brought this charming place into such notoriety that Cicero, in his defence of the young M. Cælius, thought it necessary to apologise for defending a man who had lived at Baiæ. Baiæ is now deserted. The ruins of old baths are now shown as temples, and as the remains of former palaces, visible beneath the waves of the sea. Baiæ owed its fame to its beautiful myrtle groves, hot baths, and its situation within a most charming bay, secured by surrounding hills from the violence of the winds. And Pliny says, “by the command of my physician, I must desert the delicious Baianian baths in order to proceed to Salernum and Velia, to be cured of weakness in my eyes.”*

But the Romans, in the days of their sensuality, were accustomed to use the warm bath for the purpose of removing the ill effects of gluttony, or after an unusual degree of fatigue. The Emperor Titus is said to have fallen a victim to this practice, and so

* Plin., lib. 31, cap. 2.

great was the extent to which this pernicious custom was carried, that Hadrian at last passed an edict to repress an increasing fashion, that did not escape the sarcasm of Horace.

"The poor, in mimicry of heart, presumes
To change his barbers, *baths*, and beds, and rooms."

And again he writes,—

"If he lives well, who revels out the night,
Be gluttony our guide: away, 'tis light;
Then let us bathe, while th' indigested food
Lies in the swelling stomach, raw and crude;
Forgetting all of decency and shame,
From the fair book of freedom strike our name."

For centuries after the pantheism of Rome was overthrown by Christianity, when the priesthood and its deities had passed away together, baths and mineral waters became almost generally abhorred and forsaken. In former times men could not or would not be cured by such means unless their imagination was inflamed. They possessed only glimmering lights of science to account for the marvellous. Their reason demanded an adequate cause; the presiding divinity of the spring was their only hope. But Christianity threw their deities into contempt, and the springs, divested of their pompous ceremonial, lost also their efficacy in public regard. Mankind had to be *taught* how much had been effected by the *medicinal* constituents of mineral waters. Accordingly, it was not till the ninth century that the practice of bathing and drinking was revived. Charlemagne set the example by constructing a splendid suite of baths at Aix-la-Chapelle, for his own use; and, to render bathing still more fashionable, he held his levees within their precincts. The ancient name of Bath was Akemancester (city of

afflicted men), and there is good reason to believe that Bath was much frequented about that time.

After the death of Charlemagne, however, in consequence of the long series of international disasters which followed, the attention to this subject appeared to flag. We are told, however, that the revival of bathing in Germany was owing to the prevalence of leprosy, supposed to have been caused by want of personal cleanliness: and, however it had formerly been in use amongst the ancient Germans, it was quite neglected from 1144 to 1417. It would indeed seem, such were the habits of the times, that both sovereigns and ecclesiastics found it necessary to resolve upon ingenious measures for the purpose of promoting personal cleanliness. The clergy converted the practice of bathing into an act of religion, whilst the sovereign insisted upon it as an indispensable part of a ceremonial. "The people were persuaded that they could *wash* away their *sins* and obtain absolution. These baths, so taken, were termed baths of the soul ("*Balnea animarum*" and "*refrigeria animæ*"). Many monasteries and baths, particularly vapour baths (*vaporaria*), were established, and bequests made for the *soul* baths. By virtue of these, the poor people were admitted at stated hours to bathe gratuitously, either in the cloisters or in the baths of the town. They were likewise cupped or bled when they desired, and afterwards fed or presented with bread, beer, and salt; and this for the benefit of the soul of the founder, and for cooling it and assuaging its sufferings in the fires of purgatory."

"While the sovereign, in order to bring the knights to cleanliness, and to get rid of their filthy long beards,

commanded that no knight should be admitted into any order, or any knight be created, unless he had bathed, and caused his beard to be taken off the evening before. These laws of police have now become superfluous, but bathing, being no longer a part of the duties of knighthood or of sumptuous marriage ceremonies, and having no connection with the welfare of souls in purgatory, has fallen into much neglect."

To Savonarola of Padua, who wrote upon them in 1498, is due the revival of the reputation of mineral waters. Our own countryman, Dr. Jones, in 1572, followed up the same subject in England, in a treatise on Bath and Buxton, written in the English tongue, in defiance of the prejudices of the age. For indeed it was still doubted, even under the new rule of Elizabeth, whether any under the rank of gentlemen or merchants might be permitted to peruse the Scriptures in the English. (Hume). Dr. Jones, therefore, deprecated the professional wrath of the times against his *anglicised* and therefore daring lucubration, with no slight misgivings as to the result:—

"Now seeing Galen, in whom was heaped as in a grainard: all knowledge, both philosophicall and phisicall, was enuied, disdained, backbyted, and yet of some is: what shall I think to go scot fre, that am so inferiour unto him as the scholar unto the maister: no, no, therefore I will arme my head with patience and my harte with a clear conscience, protesting before God and men (which thorow the enviousness of the time I am driven to) that this that I have done, I have done neyther of a proud mynd, ambitious desire, or ouer wening in myselfe, but of a fervent zeale to the preservation of health and mayntayning of lyfe:

bycause I saw so many repaire thither without all order. By means whereof some went away very sick, that came indifferent well, which if they had had good counsail might. And some more by hap then by cunning, as it dyd them no good, so it dyd them no harme."

Chemistry, the only key to the real nature of the springs, had been studied chiefly by alchemists, conjurors, and monks. But the opened Bible had mightily burst the priestcraft fetters which a dark and bigoted policy had forged for science. England was rousing from an intellectual sleep. For the spirit of the age had breathed upon mankind a quickening energy. It was enough to enlighten the people in order to dispel the mysterious prestige of a pilgrimage to the wells; a prestige which had too long attracted a wonderful throng of true believers in their virtues, expecting to obtain as much the pardon of their sins as the cure of their bodies.

The phenomena of nature, as in a *mirage*, for ages had not only appeared confused and distorted, but *inverted*. The flood of light dawning with the vast intelligence of a Bacon had yet to dispel the delusive mists which shrouded the temple of science. But the healing art, the offspring of observation, after the age of Bacon, could not long escape the transforming touch of science, the true philosopher's stone. The halls of medical learning, however, long re-echoed the sounds of fierce and virulent dispute. But at length the genius of medicine, arousing from the fevered delirium of enthusiasm, demanded satisfaction for the past and security for the future. Medical science was placed on a new basis, illuminated by the concentrated light of the sister sciences. For it might only be by their

aid that the veil darkly concealing the mysteries of life, health, and disease, could be even partially penetrated. By the aid of chemistry applied to the blood and animal juices, and by the microscopic scrutiny of organised particles, the age-honoured doctrine of Hippocrates, the father of medicine,—*that there are disorders of the blood and fluids corresponding to certain diseases of the human frame—has been re-established.*

But as mineral waters act principally upon the blood, it is evident that the doctrine of blood-disorder, recently revived, confers a new interest upon the study of mineral springs, calculated to raise them greatly in the scale of medicinal importance.

The Baconian philosophy applied to medicine has, slowly indeed, but securely, relaid the foundations of an ancient doctrine or philosophy of disease, which is based upon facts, not upon mere hypotheses; and it has taught new facts or generalisations of truth, and new principles for conducting a scientific and therefore an enlightened investigation of the nature and treatment of disease.

The opened Bible did not at once, however, allay the mania for pilgrimages to the springs. "Within the last two years, innumerable herds of people flocked to Saint Mogno's and Saint Robert's Well (near Knaresbro')," though, says Dr. Deane, "they are of no credit, at present, for their superstition and their reputation live and die together; their great and famous cures being rather feigned and imaginary than real." (1626.)

But though simple "holy waters" were thus stripped of their pretensions, public favour was deservedly transferred to the stronger kinds; their effects being substantial and reputation lasting. Spaa, in Belgium,

was now (1626) rising to the height of its celebrity. "So soon as the roads thither were rendered passable, the English, travellers by disposition and great admirers of the picturesque, thronged to the fountains, and filled the town with their magnificence. They loved to expend their riches. And those whose energetic passions threw them into dissipation introduced a fatal and ruinous luxury." The notorious Baïæ of the ancients was revived in the precincts of Spaa. To Dr. de Steers, twenty-five years a resident physician there, resorted the nobility of Europe. Exhausted *roués*, worn-out hypochondriacs, delicate and pallid convalescents, and immense numbers of debilitated persons, certainly found great advantage from the bracing air of the Forest of Ardennes, and the use of the sparkling chalybeate springs at Spaa; of which several were in use, and all of them enriched with a profusion of an exhilarating gas. "A milord Anglais," accompanied by his medical attendant, in 1626, arrived there, to be placed under the famous De Steers. The gentleman was singular. During the first three days of every month he neither ate, drank, nor spoke; he kept his room. On the eleventh day of the month he would rise early, go out hunting, come home hungry, eating and drinking enormously. In the third part of the comedy, "the scene entirely changed; he became passionately fond of music, and squandered hundreds upon the squallinis of that day. At the end of the month the taciturnity, fasting, &c., returned." De Steers was not slow in extolling the virtues of the springs. And acknowledging, as we must do, the powerful tonic effects of steel dissolved in water by carbonic acid gas, we may perhaps forgive De Steers pronouncing

the verdict "that they had worked miracles of cures, their effects being all but supernatural, exciting the admiration and curiosity of physicians and philosophers who had gone there." For in modern times, Dr. Sutro, a writer on the German Spas, says, regarding Spaa,— "You will find in your experience that a delicate female, after having been laid up for five or six weeks, with severe enteritis, for instance, weakened only in a small degree by the necessary remedial measures, may sometimes take quinine and iron for a very long time before regaining her previous bodily and mental health, while a month's course of one of the above chalybeates, selected according to the previous history and constitution of the patient, will often have the effect of completely restoring the former strength. Though less iron was ingested in the latter instance, the remedy was accompanied by a highly stimulating carbonic acid, so that the moving force of the blood must have been augmented and a greater power of provoking metamorphosis created, besides the addition of the required element," *i. e.*, steel, to the blood.

From the time of De Steers the celebrity of Spaa continued to rise. Peter the Great, in 1717, resorted thither, exhausted with his unscrupulous and sanguinary wars, and menaced with dropsy. Completely recovering by the use of the Pouhon spring, by drinking twenty-one glasses of three ounces each, every morning before breakfast, he caused a statue of himself to be erected over it, to celebrate his cure. These lines, thereon engraved, tersely describe the virtues of the spring :—

OBSTRUCTUM REFERAT. DURUM TERIT. HUMIDA SICCAT.
DEBILE FORTIFICAT SI TAMEN BIBIS ARTE.

But long before this period, Harrogate, enriched with a mineral spring similar to that of Spaa, had acquired no little fame from the reports of famous cures performed by the use of this well being rapidly spread among the good people of England. It was discovered in 1571, and no one had written upon it till 1626, yet "the great influx of people of all ranks" shortly afterwards, shows that it must have become widely celebrated. It was only necessary to authenticate the cures in order to induce the frequenters of Spaa to forego both the expense and toil of "going beyond Sea," and to prefer resorting to "THE ENGLISH SPAW" as it was then called, where it was thought equal benefit might be obtained at less risk both to the morals and the purse.

But the sturdy English character, ever averse to change and new ideas, except under extreme pressure from without, slowly adopted the idea of forming magnificent watering places in imitation of foreigners, for whom they had long nursed a national contempt.

Let us glance at Mr. MACAULAY's account of English watering places, a century after Knaresboro was overflowing with visitors to the "English Spaw Fountaine," at "Harrigate Head."

"Bath, as yet, was only a maze of four or five hundred houses. The hedgerows intersected the space which is now covered by the Crescent and the Circus. And the poorer patients, to whom the waters had been recommended, to use the language of a contemporary physician, 'had a covert rather than a lodging.' Gentlemen who visited the springs at Bath slept in rooms hardly as good as the garrets which not many years afterwards were occupied only by footmen. The

floors of the rooms were coloured brown, with a wash made of soot and small beer, in order to hide the dirt. As for Cheltenham, the cattle browsed over the space now covered by that gay succession of streets and villas. And to Buxton the gentry of the surrounding country resorted, with no great pleasure or satisfaction." "They were crowded into low wooden sheds, and regaled with oatcake, and with a viand which the hosts called mutton, but which the guests strongly suspected was dog." Tunbridge Wells, however, so much within the influence of the Metropolis, boasted of greater luxuries. "The Court, soon after the restoration, visited the springs, but there was no town within a mile of the spring. Rustic cottages, somewhat neater and cleaner than the ordinary cottages of the time, were scattered over the heath. Some of these cabins were moveable, and were carried on sledges from one part of the common to another. To these huts men of fashion, wearied with the din and smoke of London, sometimes came in the summer, to breathe fresh air, and catch a glimpse of rural life. During the season a kind of fair was daily held near the fountain. The wives and daughters of the Kentish farmers came from the neighbouring villages with cream, cherries, wheatears, and quails. To chaffer with them, to flirt with them, to praise their straw hats and tight heels, was a refreshing pastime to voluptuaries, sick of the airs of actresses and maids of honour."

Now Bath, Buxton, and Tunbridge, were each distinguished by only one kind of mineral water, the springs being respectively hot, tepid, and cold. But when it became generally known that Harrogate was enriched with a great variety of medicinal springs,

and that excellent accommodation could be obtained either there or at the ancient town of Knaresborough, great numbers of visitors, many with their coaches drawn by six horses, frequented the wells. It was not long, however, before the more rapid medicinal activity of the sulphureous waters, as compared with the chalybeates, happily provided remedies of a more extensive application. Yet many circumstances for a long time impeded the progress of a spot thus favoured. In 1571, the whole neighbourhood was a thick forest. The ancient "Harrigate Head" was an isolated, almost inaccessible, nook in the Wolds of Yorkshire. "He was esteemed a cunning fellow who could find these springs." Much was required to raise a wilderness to the importance of a first-rate Spa. Its distance from the Metropolis, the fostering patron of our English Spas, the dangers of the road, the absence of capitalists to embark in speculations on so sequestered a region, and the want of royal visits, would all conduce to prevent its rapid rise. We are indeed apt, in these wonderful days of world-wide news carried by lightning and steam, to underrate the difficulty of diffusing knowledge at the time we write of. In 1712, the following characteristic advertisement appeared in the *Newcastle Courant* :—"Edinbro', Berwick, Newcastle, Durham, and London stage coach begins on Monday, the 13th of October. All that desire to pass from Edinbro' to London, or any place on that road, let them repair to Mr. John Baillie's, at the "Coach-and-Horses," at the head of Canongate, Edinbro', every other Saturday; or to the Black Swan, in Holborn, every other Monday, at both of which places they may be received in the stage coach, which performs the

whole journey in THIRTEEN days, without any stoppages (if God permits), having eighty able horses to perform the whole journey; each passenger paying £4 10s., allowing each person 20lbs. of luggage; all above, 6d. per pound. The coach sets off at six o'clock in the morning."

Besides, if we compare the circumstances connected with the rapid development of some other watering places, we shall see that the merits of ancient springs situated in the heart of a manufacturing district can be estimated neither by the style and amount of its architecture, nor the number of its permanent inhabitants. When capital circulates richly and steadily in a focus of commercial enterprise, an old veteran place of resort necessarily receives for a time an indifferent attention. On the other hand, where no such absorbing interests exist, it is easy to imagine that in an agricultural province spirited capitalists find great attractions in the fields of newly-discovered Spas, promising to the plough of modern advancement a harvest too alluring to be despised. So in the wealthy and thickly populated districts, perhaps the most so in Europe, which border on Harrogate, capital is almost wholly absorbed in manufacturing pursuits. Yet any one adequately acquainted with the variety and medicinal powers of the Spas of Harrogate, the salubrious character of its soil, and the freshness of its atmosphere, must be convinced that it has not received that degree of regard which such natural advantages might justly claim. The reflective visitor to these springs, so surprising in their profusion, cannot but entertain the idea that, had this singular spot recently acquired a quick notoriety from a sudden discovery of its waters,

instead of their having been slowly brought to light during a space of three hundred years, it would have had its resources developed in a manner commensurate with its importance. The magic wand of the capitalist would have transformed the irregular architecture of individual caprice into the bolder and more beautiful lines of symmetrical design.

CHAPTER II.

LOCAL SCENERY.

AMONG the various circumstances which render Harrogate attractive as a watering place, we ought in fairness to ascribe much to its local scenery, much to its fashionable gaieties, more to its peculiarities of atmosphere and situation, but still more to the variety and abundance of its mineral springs. We shall touch on these points in order.

Local scenery, so far contributing to the health as it is a strong inducement to the invalid to be continually on the move, is of incalculable importance. A retreat devoted to the restoration of the general health, indeed, cannot abound with too many incitements for exercising in the open air, which, in proportion as it promotes the evaporation of insensible perspiration, necessarily exerts a paramount influence upon the internal functions of the body. And as too much stress can hardly be laid upon this point, we shall think it worth while further to touch upon this

question in a separate chapter, for who can doubt that a dry, sweet, and perpetually circulating air is one of Nature's great restoratives? On such accounts invalid visitors, as far as their strength permits, cannot be too urgently recommended to avail themselves of the benefits of atmospheric influence. For this purpose, fortunately, the neighbourhood possesses many spots of interest to the tourist. Landscapes of picturesque beauty, beetling scars, and venerable ruins, enlivened by enchanting prospects, offer sufficient charms for combining, by exercise among such interesting scenes, invigoration of the corporeal with recreation of the mental powers.

RIPON is an ancient city, remarkable for its early history and spacious Cathedral. There is some architecture yet remaining, of an antiquated date; the style is much varied, corresponding to the lapse of more than twenty generations; the sepulchral crypt of the Cathedral silently witnesses the course of time, by an innumerable collection of human skulls. "St. Wilfred's needle," a Saxon touchstone crypt (where "they prick'd their credit who could not thread the needle"); and the monumental sculpture and ancient inscriptions are worthy of inspection. The nave of the Cathedral is said to be the widest in Great Britain, except those of St. Paul's, Chichester, Winchester, and York. The transept, as also the vestry, contain specimens of very early Norman masonry. The Bishop's Palace, Ripon, is also worthy of attention, and a very fine view of the city may be obtained there.

STUDLEY PARK is within two or three miles of Ripon. This celebrated retreat is very richly distinguished for a graceful combination of natural with

artificial beauties, for its magnificent prospects, verdant loveliness, variety of effect, and bold scenic surprises. Indeed it is impossible to give an adequate account of its beautiful scenery in any short description. Yet I may mention its having produced in my mind a most vivid impression of a rare commingling of all those charms of landscape which harmonise with a retreat for monastic meditation: what with foreign foliage, gigantic and luxuriant vegetation, delightful bursts of wood and water, distant views, temples, grottoes and statues, half hidden amid sylvan scenes,—the imagination seems bewildered in a wilderness of magical effects. Another principal attraction of this place is—

FOUNTAINS ABBEY; a majestic pile of ruins, still noble in dilapidated grandeur, and venerable in hoary desolation. Its position is beautiful, embosomed in a sheltered valley, appearing as if excavated for its reception; here are various transmutations of the impressive and the picturesque; vast were its deserted halls; the silent repose of its unroofed chancel is sadly relieved by the prostrate tombstones of its former occupants;—the completeness of the ruin with the full preservation of all the details of its original ground plan, its unique position and ready trout stream, and all those appearances of local advantages which the sagacity of the monks of old displayed in the selection of their habitations—undoubtedly confer an interest upon a visit to Fountains Abbey which no written description can impart.

BRIMHAM ROCKS. Pedestrians, who are robust enough to breast a difficult ascent, in order to enjoy a lofty view, and admire the wild freaks of nature dis-

played in the formation of fantastic forms, boulders, blocks, and rocking-stones, dispersed in indescribable confusion, will find here an unusual treat; less hardy mountaineers can more comfortably survey these rocks from the telescope tower on Harlow Hill.

THE WHARFE and WHARFDALE. A day may be pleasantly spent in visiting this dale, which is rich in extensive prospects, by proceeding from Starbeck station to Poole, whence conveyances may be obtained for the valley of the Wharfe, Otley, Ilkley, and Bolton Bridge.

BOLTON ABBEY. This may be taken on the same circuit: but the most pleasant and direct route from Harrogate lies on the Harrogate and Skipton road; it is 16 miles from Harrogate. Bolton Abbey with its ivy-wreathed ruins, is at once lovely, striking, and bold. The river Wharfe flows quietly past the ruin, but higher up the stream the scene entirely changes its character; the banks, no longer winding in tranquil curves, are found closing in, uneven and rugged; and strangely hewn by the hand of time and the waters of ages are fantastically chiselled out of the living rock, between which the stream boils and foams amid the obstacles to its passage. The *Strid*, or narrowest part of this water-worn chasm, is always a strong point of interest; for it tempts to a feat of hardihood which has already proved fatal. A loquacious guide will tell sufficient traditions of this spot to deter the foolhardy from attempting the apparently easy "feat of the Strid." A distant view of Baden Tower cheerfully enlivens the grave solitude of the river and its ravine. Few of the visitors penetrate much farther than this point, though the Tower and Chapel are well worth an extended walk.

KNARESBOROUGH, with its Castle-green, dungeons, fortified position, dropping-well, ancient church, railway viaduct over the Nidd, and romantic woodland walks on the west side of the river, boasts many interesting objects of attraction, and no one should incur the disgrace of having been in its neighbourhood without paying it a visit. St. Robert's and Mother Shipton's Cave—and the historical reminiscences of the place, where the murderers of Thomas-à-Becket took refuge, and Eugene Aram perpetrated the murder of Daniel Clark (signalised by Bulwer), doubtless render this place very remarkable. Its fine old church is also worthy of inspection.

Camden mentions the dropping-well of Knaresborough. He says, "the waters thereof spring not up out of the veins of the earth." But the description of this remarkable town, given in the language of the early part of the 17th century, is well worth quotation.

"Gnaresbrugh (commonly called Knaresborow) is a very ancient Market Town in the West Riding of Yorkshire, distant 14 miles from the city of Yorke, where the Pole is elevated 54 degrees and 20 odde minutes. On the south part thereof is that fair and goodly Fort, so much renowned both for its pleasant situation and remarkable strength, known by the name of Knaresborow Castle, seated on a most ragged and rough rock; whence (as learned Mr. Camden saith) it is so named."

"Both the Castle and Town are fenced on the south and west parts with the River Nidd; which is beautified here with two faire bridges of stone, which lead from the Town into the forest adjoining, as also unto

a large park of his Majesty's, called *Bilton Park*, well stocked with fallow deer; part whereof is bordered by the said river. The town itself standeth on a hill, having almost on every side an ascent to it; and about it are divers fruitful valleys well replenished with grape, corn, and wood. The waters there are wholesome and clear, the air dry and pure. In brief, there is nothing wanting that may fitly serve for good and commodious habitation, and the content and entertainment of strangers. The dropping-well is known almost unto all who have travelled unto this place; the water thereof distilleth and trickleth down from a *hanging rock* over it, not only dropping-wise, but also falling into a many pretty little streams: this water first issuing out of the earth not far from the said hanging rock, and running awhile in one entire current, continueth so, till it cometh almost to the brim of the crag, which being opposed by a damme (as it were artificial) of certain spongy stones, is afterwards divided into many smaller branches, and falleth from on high in manner aforesaid."

Knaresborough Spa is near the Starbeck railway-station; the Spa comprises a chalybeate and ancient sulphur spring and a suite of baths, it is about three quarters of a mile from the Granby hotel at High Harrogate. But we ought to remark that there are first-class hotels both in High and Low Harrogate, possessing very extensive accommodation.

HACKFALL, remarkable for a noble prospect, perhaps the finest in the North of England, is 18 miles from Harrogate and 7 from Ripon. At Mowbray point, as it is called, suddenly bursts upon the sight a very fine landscape, full of grandeur in the fore-

ground and softening beauty in the distance. Both the ascent and descent from the summit are of a very pleasing and romantic character—forgetting the fatigue.

ALMIAS CLIFF is 4 miles south-west from Harlow Hill Tower, and the valley of the Wharfe may be well seen thence, and a good idea formed of the nature of the ground surrounding Harrogate on the south and south-west side; a subterranean passage or fissure is worthy of notice, which is of very considerable but unknown length.

HAREWOOD HOUSE.—Open to visitors on Thursdays, between 11 and 4 o'clock. A magnificent residence. In the park, Harewood Castle is still an object of attraction.

PLUMPTON, the property of the Earl of Harewood, is distinguished for very delightful and extensive grounds, variegated by water, rocks, beautiful walks, and tasteful arrangements of evergreens, &c., and is much visited and greatly admired.

RIPLEY CASTLE. The seat of Rev. H. J. Ingilby. Visitors are admitted on Fridays. It is one of the most ancient hereditary possessions in Yorkshire.

SWINTON. About 2 miles beyond Hackfall; one of the most beautiful and pleasantly situated mansions in the neighbourhood; the grounds have been elegantly laid out at a vast expense. A bridge, seventy feet high, is thrown over the deep ravine of Quarry Gill.

NEWBY HALL. A specimen of Sir Christopher Wren's mansion-architecture, to which noble wings have since been added. Besides the interesting tapestries which adorn many of its splendid rooms, and

the high order of its exquisite paintings, there is a costly collection of sculptures in the gallery.

HARLOW CAR possesses three alkaline sulphureous springs and a complete suite of baths, a chalybeate well much resembling the Tunbridge water, a romantic view, and a convenient hotel and grounds, quite sequestered and most delightfully as well as warmly situated.

CHAPTER III.

A FEW WORDS ON HARROGATE.

GAJETIES and gravities abound at Harrogate. The sick, to use the waters, resort thither both late and early in the year. The gay, seeking an agreeable change rather than a medicinal course, principally appear after the parliamentary recess. Balls, concerts, excursions, and promenading, and the interchange of social visits, then form a conspicuous part of the daily occupations. And whatever be the causes of the social spirit and cordiality animating the sojourners at Harrogate, whether derived from frequent excursions of pleasure for the day to such interesting retreats, or the weekly re-unions at the hotels, whence it is customary to issue cards of invitation to the various balls, or from the common topic of conversation, the virtues of the waters and the encouraging hopes of their success, kindly expressed among the visitors;—it is certain that Harrogate is remarkable for an air of friendly intercourse among its visitants, which is in

general rather a characteristic of a foreign than of an English watering place.

It is unnecessary to dwell upon the effects of mental enjoyment upon bodily improvement, to prove that the charms of scenery are real. The medicinal effects of emancipation from the accustomed toils and usual anxieties of routine life are not to be despised. The brain-worn modern must seek re-invigoration by mental rest and bodily exercise, regular hours, and moderate indulgence at the social board ; for him the dissipation of accustomed trains of thought must re-string and re-tune the instrument of thought, before he can execute a successful part in the full orchestra of active life. And, indeed, if his taste accord, music will be found no insignificant means of tranquillising a fevered brain, lulling its restless activities into oblivious repose, and beguiling the mind from a pernicious brooding over bodily ailments. And hence music has ever been esteemed as one of the greatest and most soothing influences for a mind ill at ease.

Harrogate is nondescript either as a village or a town. Extremely irregular in the style of its structures, it exhibits lordly hotels, and handsome as well as humble lodgings scattered in curious confusion. Forming a huge quadrant, on its general ground plan, its curvature is turned southward and eastward, having its extremities expanded into two dissimilar wings. Fronting the whole of this curvature as also the westward side is an extensive range of open ground, comprising about two hundred acres, secured by Act of Parliament to the use of the visitors for all the purposes of exercise. No buildings are allowed upon the open side of the road. Hence the "stray" provides

an easy and inviting retreat for the invalid from his own door to the open air; one of the chief charms of the sea-side, and a great boon to the convalescent. The stray is beautifully situated, selected for military reviews, to which it is admirably adapted, and laid out for a race-course. The "stray-owners" have, during the last few years, greatly contributed to the salubrity of the stray by an expensive but systematic draining, so that every part of it is now available for exercise, yet thirty years since Dr. Hunter found the approach to the Tewit well, or "Old English Spaw," inaccessible to carriages, and seated on a good hunter he narrowly escaped being bogged, after very considerable exertions in attempting to visit it!

The drainage of the stray, at a cost of above £1000, has now rendered it comparatively dry, and proportionately free from those unwholesome marsh vapours which infest dank and stagnant commons.

Many circumstances conduce to the salubrity of the atmosphere of this part of Yorkshire. The geological characters of the country extending eastward and westward towards the German and Atlantic oceans, according to Professor Phillips, are peculiarly favorable to dryness of soil. Currents of air, in passing over these large tracts of country, become very considerably modified. The high ground of Harrogate, thus situated, nearly at the narrowest part of England and at about 50 miles' distance from the eastern and western coasts, enjoys the oceanic breezes at once softened and dried by a land passage, and nearly purified of saline matter.

The summit of Harlow Hill is, according to the Ordnance survey, 596 feet above the sea-level, so that

the view from the top of the observatory is commanded from an elevation of 700 feet; while High Harrogate church, at its base, is nearly 450 feet above the same level; Low Harrogate being 120 feet lower. Westerly breezes prevail. Heavy showers rapidly disappear in the absorbent soil of this district.

These points, in a great degree, account for that peculiar lightness of the air of Harrogate, which is almost the first thing that strikes visitors on their arrival from lowland countries, especially those emerging from low, damp, or marshy districts. Dr. Garnett, the accomplished physician who, sixty-four years ago, was the first to form a definite analysis of the springs, tersely declares, "No place can boast of a purer or better air than Harrogate. Almost every person, on coming here, experiences a lively, bracing, exhilarating power. Situate at a great height above the level of the sea, it experiences the breeze from whatever point it blows. The air never stagnates, but circulates freely, and is not rendered humid by stagnant water." And we often hear "travelled" visitors speak of it in similar terms. MILTON would have certainly said of this, if of any place,

"But here I feel amends,
The breath of heaven fresh blowing pure and sweet."

And this accounts for the fact that the locality is free from those autumnal effluvia arising from vegetable decomposition, which are so greatly favoured by dampness of soil and a stagnation of atmospheric currents.

THE OBSERVATORY on Harlow Hill commands, by the ample telescopic aid afforded on its summit, a magnificent panorama of the surrounding country.

Indeed, we think it would be difficult, amid English scenery, to hit upon a tower-view of greater loveliness, extent, and diversity. The following lines, with which we have recently been presented, gracefully describe the chief beauties of the prospect :—

“And then on Harlow Tower we stood,
The racing breezes coursed around,
There stole to us each murmured sound,
From distant town, and field, and wood.
Castle and hall and hamlet lay,
Bare to the sky in beauty wild;
And sunlit, proudly flashing, smiled,
Fair in the golden light of day.
There swept a music o’er the lands;
There hung a glory in the skies,
That streaked the clouds with thousand dyes;
The laughing streamlets clapped their hands;
And over all the good old shire,
Thread-like, there gleam’d the public ways;
And trembled in the purple haze,
The distant haven’s ancient spire.*
Clear bursts of verdure shone with flowers;
Calm sheets of water slept between,
And far, past many a regal scene,
Uprose the proud York Minster towers.” F. A.

The view from this tower, in clear weather, always gratifies the visitors, who may thus at once comprehend the reason of the peculiar freshness of the air of the neighbourhood. They will see High Harrogate eastward, in the foreground, situated on an extensive upland slope. And, as the eye sweeps over the celebrated “vale of York, the richest, pleasantest, and

* A resident from Hull, well acquainted with its telescopic appearances, pointed out to us, not only a church steeple, but a contiguous factory chimney, which, in his opinion, together with the known direction, completely identified the steeple as that of St. Stephen’s, Hull, at a distance of 60 miles.

most extensive in Britain," the broken line of the Hambleton Hills may be discovered, fading away towards Hull, on the south-east, and Stockton-on-Tees, in the north-east, forming very bold and beautiful objects at 30 miles' distance, not unlike sharp but irregular clouds hanging upon the horizon in a summer haze. Low Harrogate, as described in 1765, "lies low, dry, and warm, compassed with small hills. To the west and south-west is a thin clear, healthy, open cold air, from a wholesome rocky desert. On the east and north-east a fine champaign, fruitful, plentiful country, fit for all manly exercises: free from whatever is unhealthy and offensive to the outward senses, either from land or water."

The very varied style of building, in Harrogate, affords great choice as regards handsomely-furnished houses, or well-appointed apartments in lodgings or hotels. The charge for lodgings varies considerably at different times of the year, regulated somewhat by the term for which they are engaged, and the demand; while at the hotels the prices are generally uniform throughout the season. And most of these hotels are distinguished as much for the abundance and elegance of their tables, as for the moderation of their weekly charges.*

There are four distinct bathing establishments.—The Montpelier Baths and grounds, comprising several mineral springs, and the Victoria Baths, are all in Low Harrogate. But the Knaresboro' Spa is situated near the Starbeck Railway Station, on the Leeds Northern line; whilst the Harlow Baths are about a mile west of Harrogate.

* From six to seven shillings per diem for board and lodging.

The most direct route from London and the South, to Harrogate, is by the Great Northern, at King's Cross. Passengers by this line change once at Church Fenton, and proceed thence direct to Low Harrogate station.*

We shall conclude this chapter with some extracts from Dr. Granville's "SPAS OF ENGLAND," who, though often comically satirical upon some of the salient points of a somewhat old-fashioned watering place, and accordingly accused of gross misrepresentation, has pronounced a favorable verdict, if not a more eulogistic, for Harrogate, than upon any other mineral Spas, whether German or English.

"Such a profusion of important mineral springs collected at one place renders Harrogate a genuine Spa, to which thousands must flock annually to seek health,—some under proper advice and management, others at random. Even in Germany, hardly any one of the most popular Spas, Baden Baden, Wiesbaden, and perhaps Carlsbad excepted, can boast of having had, during any one year, a much larger assemblage of water-bibbers." (Written in 1839.)

"Like most of the really celebrated Spas in England, Harrogate was, at the first discovery of its springs, a mere village: but unlike most of them, Harrogate remains a village to this day. . . ."

"This is precisely the circumstance which has saved Harrogate. Who can cavil at the nature, genuineness, and efficacy of the Harrogate Waters? On the

* Harrogate is 191 miles from London, 20 from York; from Leeds 15, Otley 10, Ripon 11, Studley Park and Fountains Abbey 14, Bolton Bridge 16, Brimham Rocks 8, Hackfall 18, Ripley Castle 4, Plumptre 3, and Knaresboro' 3 miles from Harrogate.

other hand, who has not cavilled, and cavils to this day, at the Waters of Leamington and Cheltenham? Those of Harrogate are unsophisticated :—because the place remains as it was. Harrogate is, in fact, a true and genuine Spa. The situation is delightful; and for geological formation favorable to human life, Harrogate stands almost pre-eminent. That such a place must enjoy a salubrious air it is hardly necessary for me to add. The extensive walks which, with immense tracts of finely-cultivated country, surround this favoured spot, allow full pay to the sweeping breezes, and render the air remarkably pure and bracing. Nothing can be purer than the air of Harrogate. Its elasticity is felt by every new visitor immediately on his arrival. A spirited capitalist would find an explored mine of wealth in Harrogate, which is not one of your ephemeral Spas, dependent on fashion; its almost peculiar waters are lasting, and so must, and will be, their reputation.”

“I have dwelt more largely perhaps than is consistent with the nature of the present work, on the Spas of Harrogate. But among the few really important Spas of which England can boast in comparison to other countries, I hold Harrogate to be of such manifest superiority—indeed I was going to say *uniqueness*, on account of the peculiar nature of its waters (if properly managed) its sulphur-mud, now first recommended, and its situation, that I felt anxious to bring all its merits before the general reader more fully than any medical treatise has done before.”

“Harrogate has the elements within itself of becoming a Spa of the first magnitude, even to the extent of attracting foreign travellers.”

CHAPTER IV.

THE WATERS OF HARROGATE.

MANY reasons have, for ages, induced both the healthy and the sick to resort to mineral Spas in quest of relaxation or relief. We are lovers of Nature more than lovers of art.

The wearied merchant and the jaded man of letters equally expect, in change of scene, with all its changeful circumstances, relief from the cares and anxieties of accustomed toils. With this class there is a growing inclination for resorting to the medicinal Fountains of Nature. And this is still more the hope of the invalid who is wearied with perhaps long and ineffectual treatment by drugs. But whatever virtues may be fairly claimed for mineral waters when properly selected, it is impossible to deny great benefit to the "change of air." The fresh mountain air, the early exercise, the mental relief, the hearty appetite, and the pleasant society of the assembled company, all tend greatly to invite the return of health, and assist most materially the medicinal operation of the waters.

But this cannot disprove the curative influence of the springs. Regimen does much, but it is not all-sufficient. The good effect of regimen is no argument against the virtue of medicine; neither can it be an argument against the virtue of powerful springs demonstrated to hold in solution the most active medicinal agents with which we are acquainted. It is our

duty, as physicians, to place our patients under the most favorable circumstances for resisting disease. That such circumstances must abound at a spa, affording unrivalled variety in the character of its waters, unsurpassed purity of air, and every inducement to enjoy it, and facilities for treatment not obtainable at home, cannot be disputed. Nor in accounting for the improvement frequently witnessed among visitors can we omit the influence of hope.

It is not merely the patients but enlightened physicians who avow a decreasing confidence in the exhibition of drugs. They depend rather upon every known means for ensuring the improvement of the general health. Many an invalid delights under new skies and a purer air to try the sparkling draughts of Nature's fountains after art has failed; and he may well be excused an enthusiastic confidence and a lively hope which greatly contribute to his restoration. The mystery which ever shrouds the secret alchemy of Nature inspires his trust. He rejoices, in spite of the interrogating spirit of the day, to be cured by subtle agencies above his comprehension, as much as he loves to contemplate the sublime and the beautiful. And though, while contemplating the healing waters springing from the rock, he may see little of the sublime or the beautiful in their gush, except in the accidental scenery of their birth, yet he cannot but think with Hofmann, the celebrated physician to the king of Prussia, that "mineral waters are of such virtue and efficacy for the preservation of health and cure of diseases, as in the highest degree to exceed other remedies prepared by the nicest art."

And these considerations become more cogent when

we reflect how great a change has come over the physician's dream of physiological life—how great a change has passed upon the present generation from the constitutions of their forefathers, whom not to bleed too often was to kill, but whose children can seldom admit of that proceeding at all. The day of the conquest of disease by heroic remedies is passing away. It is the decline of the general health which the physician has now principally to contend against; and whether he restores it by vegetable or by mineral remedies, by regimen or by bathing, or by all of them combined, this is the true secret of his success. Nor can it be concealed that the cordial co-operation of his patient wonderfully promotes the success of the physician.

But since Nature has, over many lands, distributed her mineral fountains, everywhere distinct and endowed with peculiar virtues fitted for particular constitutions and special disorders, we cannot undertake to assert that our springs of Harrogate, however various and complex in composition, are capable of curing every disorder to which man is subject. And we conceive that their just reputation can only be established upon a secure basis, by demonstrating in what cases these waters are really medicinal, rather than by claiming for them an almost universal application.

The waters of Harrogate may be arranged into four distinct classes :

- I. The pure chalybeate or steel springs.
- II. The saline chalybeates.
- III. The mild sulphureous springs.
- IV. The strong sulphureous springs.

I.—STEEL SPRINGS.

- (1) THE STARBECK CHALYBEATE.
- (2) THE SWEET SPA, near the Granby Hotel, High Harrogate.
- (3) THE HOSPITAL CHALYBEATE.
- (4) THE HARLOW CAR SPRING, very similar, as already stated, to the Tunbridge water, according to the analyses of Mr. West and Sir C. Scudamore, respectively.
- (5) THE TEWIT WELL, or "OLD ENGLISH SPAW," near the Brunswick Station.
- (6) THE ROYAL STEEL SPRING, recently added to the attractions of the Cheltenham Pump-Room.

II.—SALINE CHALYBEATES.*

- (1) THE IMPERIAL CHALYBEATE SALINE;† Cheltenham Rooms.

This name distinguishes it from the saline chalybeate in the Montpelier Gardens which contains nearly a fourfold amount of saline matter, but only a little more than half the amount of the chalybeate impregnation of the Imperial spring.

- (2) THE MONTPELIER SALINE CHALYBEATE, so designated in Professor Hofmann's Report, by the authority of the Medical Committee, had been formerly named the Kissengen water. This remark, it is hoped, will prevent the confusion arising from the simultaneous use of two distinct names.‡

* Low Harrogate.

† Incorrectly named the Cheltenham Water, to which it has no resemblance whatever.

‡ See the publication "Harrogate and its Resources," with an Appendix of Medical Remarks, by the Committee.

III.—MILD SULPHUREOUS SPRINGS.

(1) The weakest in saline matters are those of HARLOW CAR: but which, as they possess a peculiar softness and alkaline reaction, are admirably adapted for bathing purposes in all irritable states of the skin, when the stronger kind prove too stimulant.

Three springs are in use to supply the baths. The waters there are, like that of Starbeck, exceedingly pure and transparent.

(2) Next in saline strength is THE STARBECK SULPHUREOUS WATER; which, being constantly collected in covered reservoirs, one of which is now completed of a capacity of 80,000 gallons, supplies from one spring alone sufficient water for 10,000 baths during the season: the weekly supply of water being about 20,000 gallons.

(3) THE MAGNESIA WATER; now introduced by a gutta-percha tube from the bogs into the Royal Pump-Room. This water, also distributed at the bogs by a Wedgewood apparatus, is at present most lavishly allowed to run to waste; and though producing at least an equal supply of water with the Starbeck spring, and from its chemical composition being equally adapted for preservation and bathing purposes, yet no means are available for securing baths of this water to the general public. It is nevertheless patent to every well-informed resident that the Hospital patients, who principally use this water as an external application, thus derive very distinguished benefit. It has received its appellation from the whitish appearance caused by the deposition of some carbonate of lime and magnesia after long exposure in open vessels. In the

Analytical Report, it is termed the *Hospital mild sulphur-water*.

Several mild sulphureous waters are observable in open wells at the bogs, about sixteen in number, of which two only have been analysed by Professor Hofmann, viz., the magnesia water, and the Hospital strong sulphur-spring. But there is here a supply of mild sulphureous waters from those wonderful geological strata at the bogs, adequate for the formation of public baths on a very large and liberal scale. Systematic reservoirs for continually collecting the waters might be constructed, sufficient for the distribution of 100,000 gallons weekly of bathing-water. Cheap baths of the best waters plentifully supplied close at hand would prove a great boon to the visitors, and an incalculable advantage to the town.

(4) THE NEW CRESCENT WATER. We venture to give this title to the Hospital strong sulphur-water now marked at the bogs by a rude square covering of masonry. In Dr. Garnett's time no spring was more popular than the Old Crescent water, now unfortunately lost. He announced an extraordinary fact, that sulphur and iron were both transparently dissolved in the water: a chemical enigma. For a favorite experiment among the visitors is to mix a glass of the sulphur-water with one of the steel spring, the mixture instantly assuming an inky colour. How Nature here contrived to combine, transparently, the chalybeate with the sulphureous principle, in the old and new Crescent water, we are unable to explain. The new Crescent water, however, as well as the old, is distinguished for this marvellous combination: and one indeed extremely rare.

COMPARATIVE ANALYSES IN GRAINS PER GALLON.

<i>New Crescent Water.</i>		<i>Old Crescent Water.</i>	
HOFMANN.		GARNETT.	
Saline Matters . .	438 grs.	Saline Matters . .	171 grs.
Carbonate of Iron . .	1	Carbonate of Iron . .	2
CUBIC INCHES OF		CUBIC INCHES OF	
Sulphureous gas . .	25	Sulphureous gas . .	13½

(5) THE MONTPELIER MILD SULPHUR WATER is supplied, as the name indicates, at the Montpelier Gardens, and is intermediate in strength between the Starbeck water and the spring just described, but possesses properties somewhat different, as a comparison of the analyses will readily demonstrate.

(6) A mild sulphur-water, of which no trustworthy analysis is now extant, is also exhibited at the Victoria Bathing Establishment.

IV.

STRONG SULPHUREOUS SALINE SPRINGS.

(1) THE OLD SULPHUR WELL, or Royal Sulphur Spa, has now for centuries been the lion of Harrogate; and, honoured by a handsome Pump-Room, close to the Crown Hotel, it is, of all others, the spring most resorted to, and comparatively for the relief of a greater variety of bodily infirmities. But—

(2) THE MONTPELIER STRONG SULPHUR-WELL is so similar in composition as to induce the belief that, with slight modifications, the two must have a common source. Great numbers resort to this spring. And, in consequence of the delightful and shady retreat afforded by the grounds, and the musical band in attendance, besides the two other waters obtainable

there, as well as various kinds of baths, the establishment is deservedly popular.

Such, then, are the principal drinking-waters in use at Harrogate. But numerous as these are, many others exist. Within no great circuit, nearly a hundred different mineral springs attest the bounties of the liberal hand of Nature to meet the wants of not a few of the ills which flesh is heir to.

Concerted excursions to the various scenes we have briefly depicted in words form a conspicuous feature in the summer pastimes. These trips, for reasons already mentioned, we would encourage by every possible means. If change of air be the *dernier resort* of physicians, and sometimes surpasses in beneficial effect the most skilfully applied medicines, we are not to depend on mere change of residence, but upon a full submission to the free influences of the air of the country, not of closed carriages, nor of close rooms, but upon frequent, persevering exposure to the bracing breezes. The animation and gay hilarity usually created by parties of pleasure, the charming strolls through new but romantic scenes, and the redoubled exertions and amusing adventures incident to an agreeable *pic nic*, cannot fail, when judiciously managed, profoundly to promote, in a careworn, overwrought, nervous system, the restoration of the general health. We cannot wonder, therefore, at the frequency and success with which such excursions are so happily projected.

THE HARROGATE SPAS.

PART II.

ON AIR, WEATHER, AND BATHING;

AND

THEIR INFLUENCE ON THE GENERAL HEALTH;

ESPECIALLY IN AN UNHEALTHY CONDITION
OF THE SKIN.

PART II. ON AIR, WEATHER, BATHING, &c.

CHAPTER I.

CHANGE OF AIR.

CONNECTED with the external world by exquisite sensibilities, the human frame is undoubtedly subjected to innumerable influences through the medium of the air. Its nerves, widely spread upon the surface, catch a thousand impressions, the transmission of which, more or less, institute important organic changes. Man has within him, besides the mental, an assimilative principle of growth in common with plants.

The same influences which, borne on the wind and poured in the sunbeam, so tenderly cherish the flowery loveliness of the valley, and so lavishly develop the majesty of the forest, also tell upon him, in health, with a purpose equally constant and beneficent. It was of truth, with a deep philosophic insight, that *Thomson* finely wrote—

“Ye fostering breezes, blow!
Ye softening dews, ye tender showers, descend,
And temper all, thou world-reviving sun,
Into the perfect year.”

Surely man, to whom belong the susceptibilities of a sentient being, as well as the vegetative process of nutrition, still more yields to such influences ever stirring around and within him. *Change of air*, including many changes in the condition of the atmosphere, cannot have been without reason designated as the *dernier resort* of the convalescent and languishing sick,

who not seldom find in it a means of completing those constitutional changes which, it may be, medical art had already established. The harp of Hygeia sometimes swells forth the music of health, responsive to the fresh mountain-breath, in harmonies in vain evoked amid the discordant din of cities.

The change, indeed, involves much more than mere change of air. Nature's wheels, in the whirl of modern times, oftentimes groaning on their axles, demand the oil of relaxation. In convalescence from acute diseases, change of air is the best restorative. Country air, to delicate children reared in cities, will often establish the ruddy glow and sprightly vigour of health, when all other means have failed.

Pure air freely ventilating the lungs during healthful exercise, is unquestionably the most efficient restorative and purifier of the blood; the want of it, in effect, the most fatal poison. The large draughts of fresh air inhaled by the sportsman in the heat of the chase, by its supply of oxygen, burns off, as in a slow furnace, the waste and worn-out particles intended continually to be thrown off in health. Contrast his healthy brilliance of complexion with the sickly appearance resulting from deprivation of fresh air, though active exercise, perhaps, in factories and workshops, may not have been wanting. The blood becomes poisoned by the accumulation of its own products, unless freely ventilated every moment.

Change of air, then, by placing the system under increased facilities for spontaneous purification, when the opposite conditions have long persisted, must have an important effect on disorders arising from an impure state of the blood.

Curious is that law of Nature which renders the nourishing element of one organ poisonous to the life when applied to another. Carbon, the chief basis of every kind of food, and oxygen, the active agent in its consumption, unite chemically in the blood forming that carbonic acid, so fatal if accumulated in the blood, yet so grateful when introduced into the stomach, as in champagne and other effervescing wines. In health, a just equilibrium is established between the amount of oxygen inhaled by the lungs and of the carbon in the blood, supplied by the food. The oxygen consumes the carbon, the product is exhaled as carbonic acid. Hence it necessarily follows that insufficient ventilation of the lungs, and particularly when impure air is breathed continuously, permits an excess of carbon to accumulate within the system. Thus, the amount of the dark venous blood gradually preponderates over that of the scarlet arterial blood; and this explains the dusky complexion of persons labouring under a process of slow carbonic acid poisoning; an appearance also often witnessed in those dying from the effects of diseased lungs; and a constant effect of an inadequate supply of oxygen. Carbonic acid, acting upon the brain and nerves, stupefies the intellect, prostrates the energies, and depresses all the vital functions, whilst, on the contrary, the action of oxygen is to impart vigour, elasticity, and nerve, and to vivify all animated nature.

Any means, therefore, which tend to remove the poison and supply the antidote are of the utmost consequence to the health. The air of sleeping apartments is not seldom one of the unsuspected causes of a carbonized state of the blood.

A most common condition is a surcharge of the blood with carbon; a certain result of a prolonged indulgence in close apartments, close carriages, and ill-ventilated assemblies. The following anecdote will illustrate this point:—A young lady who came to Bath, to put herself under the care of Dr. Adair, gave a rout, and insisted that he should be of the party. The room was small, the company very numerous. He had not been seated long at the card-table before a young gentleman fell into a swoon. The doors and windows, as a matter of course, were thrown open, by which the young lady was much injured. How the rest of the company fared (said the doctor) I know not, but my own feelings and sufferings after I retired from this *oven*, convinced me of the dangerous consequences of such meetings. On declaring, a few days afterwards, to one of my medical brethren, my resolution of writing a bitter philippic against routs, he archly replied, "Let them alone, doctor, how otherwise should *twenty-six* physicians subsist in this place?" It cannot be doubted, that in the continual exposure to the deleterious influence of the emanations collected in such assemblies, originate many of the nervous symptoms consequent upon the enjoyment of the London season. Persons so affected, in fact, labour under a slow poisoning from carbonic acid gas. This gas, it is true, exists in the atmosphere, but only in minute quantities, viz., 1-25 per cent. But in crowded assemblies, and in close rooms, especially where candles, oil, camphine, or wax-lights are consumed, the per centage frequently rises a hundredfold. Lavoisier, upon examining the air of a hospital in Paris, discovered such an increase, viz.—

In the lowest ward 4 per cent. of carbonic acid gas
 In the highest ward 2½ „ „

The air of the Tuileries, after the end of a play, contained also 2½ per cent. Terrible examples of wholesale mortality, not merely in the barbarous murders of the notorious *Black Hole*,* Calcutta, but in a charitable hospital, are on record. During the years 1782—1785 two thousand nine hundred and forty-four children under 14 days old died in the Lying-in Hospital, at Dublin, out of 7650; this prodigious loss of life was at last ingeniously traced to deficient ventilation, in consequence of all these children dying under symptoms of carbonic-acid poisoning. All these ill-fated little victims “foamed at the mouth, their thumbs were drawn up into the palms of their hands, their little jaws were locked, the face swelled, and they looked as though they were choked. The ventilation of the wards, by means of tubes, six inches in diameter, introduced into the ceiling, completely succeeded in arresting this shocking mortality. In the next *three years* the mortality was diminished nine times. Only 165 died in that time out of 4243. Never was any principle more fully established. An unsuspected chronic poisoning from vitiated air had long reigned with unmitigated malignity.

* Mr. Holwell, and all the survivors from the catastrophe, were immediately seized with *putrid fever*. Mr. Holwell says, his thirst in the Hole at first grew insupportable; his difficulty of breathing increased; and he was seized with a strong palpitation of the heart. Such were the sufferings of those unfortunates, “that they used excretions and abuse to provoke the guard to fire upon them and end their miseries. They dropped fast on all sides, and a *pungent* steam arose from the bodies of the living and the dead as *pungent* and *volatile* as *hartshorn*.”

The tender condition of young infants requires, on their first introduction to atmospheric influence, a purity in its nature which cannot excite too much solicitude. Our forefathers, to judge by an ancient MS. poem, must have suffered far less from such poisoning than their dissipated descendants. It was the custom at Court, immediately after dinner, to resort to the open air for games of amusement.

“To daunce they went, all in same
To see them playe hyt was fayr game
A ladye and a knyght,
Ther they playde, the somers days
All what hyt was neyr nyght.”

A simple calculation will show how readily the air of an inhabited room, when badly ventilated, may become impregnated with carbonic acid gas. We breathe about 17 times per minute during sleep, and more frequently when awake; and at each breath inhale about six pints, i. e. about one thousand gallons in eight hours. But air, returned from the lungs, contains *four* per cent. of carbonic acid, so that about forty gallons of the gas are diffused in a sleeping apartment in the course of a single night by the respiration of one person. In a close unventilated bed-room, towards morning the air becomes exceedingly unwholesome to its occupant. And if the room be small, and used by two persons, the whole of its contained air will have been respired, and be sufficiently impregnated to act as a slow poison on the constitution when long continued. We have seen Lavoisier found the air of a hospital contained one hundred times its natural proportion of carbonic acid, viz. 4 per cent., i. e. the same per centage as air once inhaled. The patients were in effect, there-

fore, breathing entirely vitiated air. But experiments have been conducted to ascertain in what proportions common air requires to be impregnated with the gas, in order to have a poisonous effect. Dr. Golding Bird ascertained that an atmosphere containing five per cent. proved fatal to a bird in thirty minutes : we cannot doubt that a much less impregnation would in time prove highly deleterious. *Professor Christison* remarks, "the cases of insidious poisoning by small doses of carbonic acid gas, scarcely admit of explanation, save on the grounds of the essential and specifically poisonous action of the gas, when sufficiently diluted to become respirable." Delicate persons with contracted chests, are much more sensitive to the poisonous action, the first symptoms of which, and generally experienced after long continuance in hot, close, and crowded assemblies, are throbbing headache, a feeling of fulness and of tightness across the temples and back of the head. Giddiness, loss of muscular power, a sensation of tightness at the chest, increased action of the heart and palpitation often succeed. The ideas become confused, the memory partially fails ; a buzzing noise in the ears, impaired sight, a strong tendency to sleep, or sometimes actual fainting occurs. These are the early stages, when speedy removal to fresh air will do much to restore animation. It is unnecessary to describe the severer symptoms. The gas is absorbed as well by the skin as by the lungs, and thus produces equally injurious effects. We cannot doubt that much of the mortality in the war-hospitals had its origin in the same cause. Ballingall, whose extensive experience deserves attention, declares "It has

often been proved that more human life was destroyed by accumulating sick men in low, ill-ventilated apartments, than by leaving them exposed in severe and inclement weather, at the side of a hedge or common dyke."*

The removal from such deleterious vapours is, then, a powerful reason of benefit received by change of air. Indeed, so animating are the effects of emerging from close cities to the fresh breezes of the hills, that it seems much of the enchantment of the loveliest scenery would lose its chief spell, but for that exhilarating air which gives a keener sense for the beautiful.

"Thus, when the changeful temper of the skies,
The rare condenses, the denser rarifies
New motions on the altered air impressed,
New images and passions fill the breast;
Then the glad birds in tender concert join,
Then croaks the exulting rook and sports the lusty kine."

Virgil.

But other changes in the air we breathe result from resorting to new localities. Let us consider its composition and action in another point of view.

The atmosphere, forty miles high, becomes rarer as we ascend; but if reduced to one uniformly dense envelope around the earth, it might be considered as about five miles deep. Three gases form it by simple *mixture* without chemical combination, *nitrogen*, *oxygen*, and *carbonic acid*. Neither of these gases interferes with the other. The circumambient ocean is

* Dr. Arnott's ventilator, usually inserted in the flue of the chimney near the ceiling, is, we think, the most efficient instrument in use. The air of a sleeping apartment furnished with it, during some months of observation, constantly seemed fresh and pure after an early ramble on the hills, when the ventilator had remained open during the night, and as uniformly felt close and impure when it had remained closed at night.

made respirable by the dilution of its oxygen with nitrogen.

The oxygen, diffused, uncombined, and ever active in the processes of all animated nature, essentially sustains every terrestrial form of life. Carbonic acid forms an immense treasury for the growth and nutriment of animals and plants.

The elements combine in producing upon the surface of the body a variable pressure which, when the barometer stands at 30 inches, and the thermometer at 60 degrees, may be estimated as follows :—

Pressure of Nitrogen gas . . .	22764 lbs.
————— Oxygen gas . . .	6912
————— Carbonic acid gas . . .	15
————— Watery vapours . . .	309
<hr/>	
Total average pressure on the surface of the human body . }	30,000

This calculation explains the influence on the general health of variable weather, as indicated by the barometer, and of residing on very high ground. It also shows that the weather-glass, for every movement of the mercury, denotes a change of pressure on the human frame at the rate of one thousand pounds pressure for each inch of rise or fall within the tube of the instrument. According, then, to individual peculiarities, delicate persons experience a real change of sensation dependent on barometric change of weather. A sudden rise in the glass is, in some, accompanied by an increased flow of animal spirits, corresponding to increased atmospheric pressure. Two inches rise denotes two thousand pounds increase of pressure, whilst a similar fall, foreboding inclement skies, elicits a corresponding languor or depression. And it is remarkable that Dr. Moffat has recorded,

that of seven sudden deaths, five happened with a *north-west* wind accompanied by hail-storms. And that during the years 1850, 1851, all the attacks of apoplexy occurred either during, or immediately after, a fall in the barometer. The atmospheric pressure, indeed, acts upon every part of the frame as a universal and subtle bandage pressing equally in all directions. The tension thus produced is an essential condition for the discharge of the vital functions; and the variation of that tension, a cause of definite alteration of those functions. They say it is impossible to infuse a good cup of tea on the top of a high mountain, because water, owing to the diminished pressure of the atmosphere, evaporates at many degrees below the boiling point: a fact which simply illustrates the principle, that evaporation from the human skin proceeds more rapidly on high ground. We may therefore give a scientific apology for the complaints of the delicate, uttered during the prevalence of unfavorable weather. We can account for the depression, sinking, weakness, and tremor, difficulty of breathing, and general discomfort, which then, more or less, actually distresses them. The loss of tension is real, and, doubtless, so are also, in many persons, the corresponding sensations. But the individual effects of increased or diminished pressure depend entirely upon the state of the constitution at the time.

The nervous centres are peculiarly susceptible to this alteration. The brain and its continuation into the spinal canal, are protected in a bony case, and by means of the blood-vessels with which they are plentifully supplied, are susceptible to atmospheric

pressure which is unerringly transmitted by the fluid which surrounds them, like a water cushion; within the skull and spinal column. But variable pressure especially affects nervous sensation. Let us illustrate this point from Mr. Lane's Travels in Egypt. He describes a curious custom of the Eastern ladies, intended to modify the pressure of blood about the head in that torrid climate.

First comes a small close-fitting cotton cap, next, a red cloth one with a tassel at the crown. A square kerchief of printed or painted muslin, or one of crape is wound *tightly* round. A kind of crown, called ckoor's is a common ornament among the ladies, sewn upon the cloth cap. It is often made of diamonds, set in gold, but of *considerable weight*. It is at first painful to wear, and women who are in the habit of wearing it complain of headache when they take it off!

But further. Atmospheric changes profoundly affect the motion of the animal juices.

Baron Liebig has published an interesting volume on this subject. It appears from his researches, that the salutary influence which has ever been ascribed to change of air, depends upon newly discovered principles. Delicate membranes pervade the human frame. The minutest blood-vessels consist of tubes of such membranes inconceivably attenuated. The ultimate tissues are placed on their outside, and the circulating fluids within them. *But such fluids possess the property of exuding through the membrane in a manner which depends, according to LIEBIG, principally upon atmospheric pressure, the dryness of the external air and its temperature.* The same principles regulate

the passage of the digested food through the mucous membrane into the blood-vessels; and the same principles regulate, when the skin is in a healthy condition, the evaporation of the insensible perspiration, as well as the exhalation of effluvia from the lungs. An experiment, known to every housewife, will illustrate this point. If a common jar be filled with water and tightly covered with a thin bladder in dry weather, especially on high ground, the bladder will shortly become concave by the evaporation of some of the contained water. Evaporation from the leaves of trees produces a powerful force which raises the sap to the highest leaflet from the lowest root.

All this accounts for the increased appetite, improved digestion and heightened spirits, experienced from exercise promoting perspiration, whether sensibly, as in sweat, or insensibly, as a vapour, in the open air and on high grounds, when the atmosphere is clear, dry, and highly favorable to evaporation. On the contrary, we know that a damp murky situation is exceedingly unfavorable to the spirits and general health. Sidney Smith describes his sensations on returning from the country to town, with his usual piquante style. "I have just got into all my London feelings," says he, "which come on the moment I pass Hyde Park corner. I am languid, unfriendly, heartless, selfish, sarcastic, and insolent. Forgive me, thou inhabitant of the plains, child of Nature, rural woman, agricultural female! Remember what you were in Hill Street, and pardon the vices inevitable in the greatest of cities."

We may sometimes observe the salutary but rapid benefit experienced by persons emanating from un-

healthy districts. Without the aid of any medicine whatever, by removal from the ill-ventilated counting-house, from the effluvia of a multitude, and the reeking smoke of the manufactories, to a place affording the opposite conditions, we often observe that the dull sunken eye brightens; the characteristic sallowness disappears from the features; the step becomes sprightly; the chest expands with increased desire for air, while the pulse acquires a softer, slower, and more healthy beat: changes which are not so observable by resorting to a humid locality.

The tranquillised nervous system also accumulates power derived from all these agreeable effects. Everything favours it. Free exhalation from the skin favours a more equable circulation of the blood, better nutrition of the nervous system, and a more steady flow of nervous energy, to sustain the functions of every part.

We cannot overrate the sanatory importance of what is called seasonable weather. It has been recorded in ancient times, and confirmed in all subsequent ages, that the constitution of the year,—the peculiarities of the spring, summer, autumn, and winter,—the amount of rain, mist, fog, and heat,—the prevailing winds, and the condition of the sky, whether clear, serene, overcast, gloomy, or changeable,—influence the health, according to the state of the individual, in a manner deserving close observation.

The watery vapour suspended, according to its height, to melt in dews and mists, or fall in showers, enwraps the globe in an ever-changing mantle which regulates the radiating heat of its swarming surface;

or invisibly dissolved in the air, withdrawing its clouds, gives keenness to the nipping night. Anon, pregnant with blight and tempest, its vapours resolve into stormy hail, emit the purifying flash, auspicious to the health of man, and restore to the weeping heavens a smiling equilibrium of the elements.

Rain, damp, mist, and fog, tell heavily upon the vital functions, by producing a chilling effect. For when the body is long exposed to a cool, damp atmosphere, its natural heat is more rapidly conducted away than by exposure to a cool, dry air; and the excess of moisture being unfavorable, as we shall show, to the flow of the insensible perspiration, necessarily has a depressing as well as a chilling effect upon the constitution.

The direction of the wind and its velocity also peculiarly affect the health. Abundant observations show that a north-east wind proves most fatal to the consumptive, the south-west least so. A strong north-east wind, accompanied by continued cold and moisture, occasions a considerable increase of mortality from disorders of the lungs. Further, a moist, warm atmosphere promotes vegetable and animal putrefaction; and if *calm* also prevails, that particular constitution of the season is established which is most conducive to fatal epidemics.

A southerly wet autumn, with an overcast sky, followed by

A southerly damp, at first mild, and then northerly severe winter, ushering in

A southerly calm, very wet spring,

was, according to the observation of Hippocrates, the

precursor of a pestilential year. And it is worth while noting that the *sweating* sickness of 1506 was preceded by an exceedingly wet year and a severe winter.

The *Influenza*, which has appeared in England about seventeen times during the last three hundred years, was invariably ushered in by wet seasons, and in general by a southerly wind. In 1510, it occurred "after a long *moist* air!" In 1577, there was a great scarcity of corn, "from the past great rains. All the corn was choked and blasted, and the harvest exceedingly wet and rainy." There were "great gluts of rain in 1762." And on the next invasion of *Influenza*, ten years later, the autumn had been rainy, the following spring was very late, and the season became "*gloomy, cold, and humid*, with occasional dry fogs and peculiar storms."

Hippocrates records, that the combination of seasons just mentioned, preceded an epidemic of malignant erysipelas, continuing till winter, which destroyed the skin, bones, and laid bare the ribs; whole limbs dropped off, and the mortality was great. And a *southerly calm, hot, severe summer*, succeeding a southerly calm drenching spring, the epidemic continued to rage, gigantic boils appeared, and all kinds of fevers.

The Cholera and the *Influenza* spread more rapidly during the prevalence of a southerly wind, favoured by a *dead calm*, and an exceedingly gloomy and moist condition of the atmosphere. Mr. Hingeston observes, of the Cholera, 1854, "The calm that was the greatest was the worst. The disease began to decline as the wind rose." Between August 19th and October 21st, there was a calm, frequently a dead calm, ex-

cept during ten days, with what sailors call *cat's paws*, along the surface of the stagnant ocean.*

We have seen, then, how generally epidemic years are accompanied by a calm, moist state of the weather; let us also note a different combination of—

*A northerly stormy wet autumn,
A northerly stormy drenching winter,
A northerly wet, cloudy, cold spring,
A northerly cool summer, followed by
A northerly, very damp, autumn.*

Hippocrates tells us that, in this case, the first two seasons were tolerably healthy, but that the spring proved unhealthy. Intense inflammation of the eyes commenced, which lasted till autumn, and which destroyed the sight. In the summer and autumn, fatal dropsies followed dysentery. Bilious and watery diarrhœas, fevers, rashes, convulsions, and swellings about the ears, marked the peculiar constitution of the year.

The contemplation of the accurate records preserved in the writings of Hippocrates, the most distinguished physician noticed in history, is full of instructive interest. He vividly shows us the dependence of present disease upon past, as much as upon present, seasons. Those who succumb to prevailing diseases, carry about them a peculiar susceptibility, modified by the continuous or sudden action of the weather telling upon a feeble state of the functions of the body; a state which predisposes them to its attack, however excited.

The popular belief in the effect of certain winds, was thus quaintly expressed by Tusser, in 1654:—

* 'Association Medical Journal,' 1854.

"The *West*, as father, all goodness doth bring,
The *East*, as forebearer, no manner of thing;
The *South*, as unkind, draweth sickness too near,
The *North*, as a friend, maketh all again clear."

The south and east winds were condemned, and the north and west equally praised by the ancients. "In a thick and cloudy air men are tetrick, sad, and peevish; and if the *western* winds blow, or there be a calm, or a fair sunshine day, there is a kind of alacrity in men's minds. It cheers up man and beast. But if it be turbulent, rough, cloudy, stormy weather, men are sad, lumpish, and much dejected, angry, waspish, dull, and melancholy." Doubtless, a swift wind conveys many of its properties derived from passing over large continents. The eastern wind, blowing from the Russian steppes, is proverbially hostile to the English constitution. Wind singularly affects the rheumatic and delicate. We knew a sailor who was regularly, once a fortnight, attacked with ague, so long as the eastern wind prevailed, but was free from it when the wind shifted its quarter. Experience on a large scale shows that child-bed fevers prevail chiefly during cold moist weather, when they are apt to be fatal. And Hippocrates asserts, that if the winter be *southerly showery, and mild*, and the following spring *northerly, dry, and winterly*, those women who expect their confinements in the spring are apt to experience premature labours.

Among the various influences favorable to health, experienced in resorting to the open country, must certainly be reckoned that of solar light. No artificial light can be a healthy substitute for the rays of the sun. The assimilative or nutritious processes in

man, as well as those of plants, demand the vivifying powers of the sunny beams of day.

Scrofula rages in darkened dwellings. Personal experience, reading, reflection on a great number of facts, says Baudeloque, and the analysis of a great many observations, have convinced me, that particular conditions of the atmosphere are a principal cause of scrofula. However indifferent the food, however much cleanliness is neglected, whatever the climate, the exercise, the duration of sleep—if the house in which he dwells is placed in a situation freely and directly exposed to the sun's rays, and fresh air, and the house be sufficiently dry, airy, light, and well proportioned to the number of its inmates,—scrofulous diseases will never make their appearance; whilst if the habitations be withdrawn from the rays of the sun, and a renewal of fresh air be difficult,—if, in short, they are small, low, dark, and with difficulty ventilated, scrofulous disease will inevitably follow.

If, indeed, we regard the agency of solar light in regulating vegetation, in reversing a chemical action, for the leaves of vegetables inspire oxygen, and breathe forth carbonic acid in the dark, and reverse this action in the daylight; or contemplate the singular manner in which the sunbeams affect their colours, and in a dark place, draw them to seek the light, and compare its effects upon man, we shall see how essential is solar light to vigorous animal, as well as vegetative, development; numerous observations prove that it promotes both the symmetrical growth of the young, the perfection of the blood and complexion, and the energetic metamorphosis of the ultimate tissues of the frame.

“In maladies characterised by imperfect nutrition and sanguification, as scrofula, rickets, anæmia, and in weakly subjects, with œdematous (or swollen) limbs, free exposure to solar light is sometimes attended with very happy effects. Open and elevated situations probably owe part of their healthy qualities to their position, with regard to it. The observations of Dr. Edwards, on the influence of light promoting the perfect development of animals, led him to conclude that in climates where nudity is not incompatible with health, exposure of the whole surface of the body to light is favorable to the regular conformation of the body; and he has therefore suggested insolation in the open air as a means calculated to restore healthy conformation in scrofulous children, whose deviations of form are not incurable.”

We have seen, then, how intimately associated are atmospheric changes, denoted by the term change of weather, with the diseases prevailing at particular seasons of the year; that they are capable of affecting the vital condition of man as well as of plants; and that the air we breathe, by ventilating or damaging the blood, by pressing lightly or heavily on the body, by obstructing or promoting both perspiration and the motion of the animal juices as well as the digestion of the food, deeply affects the bodily health. We have also seen how certainly such results are developed by changes thus produced on the various workings of the human skin.

We shall now further consider the insidious effects of a weak condition of the skin which disables it from resisting hostile atmospheric influence.

CHAPTER II.

DEBILITY OF THE SKIN AND ITS INSIDIOUS INFLUENCE
IN A CHANGEABLE CLIMATE, UPON THE HEALTH.

“Against the rigours of a cold damp heaven,
To fortify their bodies, some frequent
The gelid cistern, and, where nought forbids,
I praise their dauntless heart; a frame so steel’d
Dreads not the cough, nor uncongenial blasts
That breathe the tertian, or fell rheumatism;
The nerves so tempered, never quit their tone,
No chronic languors haunt such hardy breasts.”

A most common, and yet too often an entirely unsuspected cause of decline of the general health, is a debilitated state of the skin, undistinguished by any *visible eruption*.

And though, indeed, many valuable works have been written upon *visible* skin diseases, we are not aware that the simple form of *debility of the skin* has yet been definitely noticed as a disease. It has probably been overlooked as such, because, in general, no external appearance fixes its stamp to distinguish a disorder which is one rather of function than of organic change, as the term strictly implies. External and visible derangements of the skin, of great variety, may, it is true, co-exist with its debilitated functions; we may observe it to be harsh, dry, deficient in its natural softness and elasticity; that it cracks easily and does not heal kindly; but these are not necessary signs of the debility. Others are required: such as the manner in which bathing in various kinds of baths, as well as how change in the weather, affect the general surface, in order to show when this debility really exists.

We might, for the sake of a broad illustration, perhaps venture to divide the community into two distinct classes : those who can, and those who cannot, bathe in the sea, with pleasure and advantage. We should find, upon a careful examination, a large number of the latter suffering under a debilitated state of the skin. We do not say that such a disability or disinclination for sea-bathing is always a decisive symptom, but it is certainly a presumptive one, of such a state, unless organic internal disease already exist. And whether the surface be visibly affected or not, we are of opinion, that the debility in question gradually tells upon the general health in two principal ways.

I. When, from fatigue or other causes, the already feeble powers of the skin cannot sustain its circulating and exhalent functions under *accidental* exposure to change of weather, wet or cold, and the health becomes imperilled by the serious effects of "catching cold upon cold."

II. Debility of the skin, under *continued* exposure to atmospheric influence, gradually inflicts an insidious, though a chronic, injury upon the general health ; an injury, directly or indirectly, arising from the following physiological conditions :

(1) A weak, unequal, and deficient circulation of the blood through the vessels of the skin.

(2) An increased susceptibility to damp and cold, and changes in the weather.

(3) A morbid sympathetic action between the skin and the various visceral organs.

(4) Obstructed perspiration,* the most fertile source

* In some cases, debility of the skin is expressed by excessive colliquative sweating.

of chronic colds, bronchitis, diarrhoea, and disorders of the kidneys, &c. ; and, in fact, a cause of dead particles dangerously surcharging the blood.

(5) Lastly, derangement in the nutritive functions of the skin. And this may comprehend the origin of a variety of *visible* skin disorders, which, so far as they save more vital organs from a dangerous attack, may be considered salutary efforts of Nature.

The very opposite effects produced on the vigorous and on the weak, by the action of the cold bath, prove how much is wanting in the condition of the delicate to raise them to the standard of health. A comparison of the different phenomena produced, shows how much can be accomplished through the skin, by gradually educating and training the nervous centres to supply nervous energy to the cutaneous nerves, whenever and wherever it is demanded, to react against external impressions, of whatever kind, whether in the act of cold bathing or in accidental exposure to damp, wet, or cold, or change of weather.

Let us contrast the effects of cold bathing, in perfect health, with the results produced in an opposite state. The robust bather boldly plunges into the coldest river ; in a moment he rises to the surface, suddenly excited by the shock into one general glow of vital reaction. The vivid impression of the cold plunge has evoked the energetic action of the whole nervous system. Suddenly telegraphed by their expansion on the skin, these nervous centres discharge a mighty force to arouse their involuntary muscles of respiration and circulation. The lungs and heart, momentarily oppressed with the tide of blood driven inwards by the first shock, *react*. The

chest heaves with vigorous inspirations, the heart dances wildly with the inward torrent; the vital stream, rapidly charged with oxygen in the lungs, rebounds through the frame to the forsaken surface; now the awakened energies diffuse a delightful glow of buoyant exhilaration; now a lusty swimmer, as in a native element, combats the wave with sportive vigour and animation, and quits it refreshed, re-strung, and braced for feats of strength or speed.

But change the scene. Watch the young, delicate tyro at the sea-side, thoughtlessly forced, either by folly or ignorant solicitude, to take the dreadful plunge; a practice which, as it has sealed the fate of thousands, cannot be too strongly condemned. Agitated, amazed, and confounded by the first sudden shock, the shuddering victim of debility feels indescribable sensations of distress. The nerves of the skin suddenly paralysed, and its blood-vessels contracted, the system unnerved, and a volume of blood driven forcibly inwards, the vital organs, thus taken by surprise, are at once overpowered. *The great centres of nervous energy, unused to this novel emergency, cannot respond to the sudden demand upon their capital of nervous force.*

The faltering circulation, the agitation, the sickness, the ringing of the ears, dimness of sight, giddiness, and prostration, equally attest the general fact. The system cannot recover from the shock, the chill, and the checked circulation, till many hours have elapsed. No wonder, then, that there are persons who, having once made the rash experiment, fear to repeat it to the last day of their existence.

We cannot doubt, when reflecting on such effects,

how intimately the extensive expansion of the great nervous centres upon the general surface of the skin, brings those centres into direct communication with external influences. And whilst this nervous expansion is a ready means for rousing the dormant energies of the whole nervous system, to maintain a higher tone, yet, the same nerves, when relaxed and debilitated, on the other hand, constitute a most fertile source of danger to the health, when cold and damp, are continuously applied; a principle which explains much of the injury resulting from residing in low, damp, marshy districts, in a debilitated state of the skin.

But, it may be observed, that as healthy blood can alone maintain the body healthy, an ill-nourished one is generally diseased. So far, therefore, as it can be shown that the *reactions* of bathing, just described, really exalt the nutritive functions of the body, we may count upon great improvement in those functions which regulate the nourishment of the frame. For nutrition is a constant act of the blood, and therefore, healthy nutrition depends on the constant action of healthy blood, or, translating this into more explicit language, health depends on the activity of all those processes by which the health of the blood is maintained, and by which its vital acts are facilitated. Whatever, therefore, favours these vital processes of the blood must improve the nutrition of the whole body, and consequently tend to eradicate those diseases originating in *defective nutrition*.

But the vital activity of the blood is so intricate and comprehensive a question, that it may suffice to notice, among the phenomena produced by bathing,

(1) The generation of animal heat. (2) The agency of oxygen. (3) The production of a vigorous circulation of the blood through every part of the frame. (4) The promotion of organic waste, purifying the system from refuse elements, accumulated unless discharged through the skin, &c. (5) The undoubted influence of the nervous system upon *their* discharge through the secretions.* All such vital processes can be shown to be influenced by bathing, and exert a profound influence on nutrition, and especially upon the growth and the symmetrical development of youth, a true effect of the vigorous execution of the laws of growth.

No attentive observer, indeed, of the effects produced by the singular reaction induced by cold bathing, can doubt, so general a glow must everywhere quicken the vital processes of the blood. By it, every organic action is energetically enlivened; by it, nervous action, respiration, and circulation, are greatly augmented. Hence results a variety of important changes, closely connected, either with the manufacture or purification of the blood. All the secretions, being under nervous influence, are modified. Increased respiration affords a better supply of oxygen to the blood. Hence the arterial, or red blood, reaches further. Red blood, the only nourishing portion, penetrates, during reaction, to the inmost recesses of the smallest blood-vessels; it therefore facilitates the nutrition of the whole frame; whilst, as it becomes more highly charged with oxygen, the worn-out elements of the frame are more rapidly replaced by new.

* Every secretion is truly an act of the blood, although modified by other causes.

Besides, by the improved circulation, all these actions are greatly promoted.*

It is on such accounts, that several disorders of defective nutrition receive surprising benefit from the proper employment of the cold bath. Thus, in *rickets*, an affection depending upon disordered nutrition, it is highly beneficial. So also, the strumous constitution, where there is a tendency to consumption, enlarged glands, and general delicacy, may receive the most decided invigoration from cold bathing; and this complaint is also connected with disordered nutrition. A variety of affections of the organs of digestion, associated with the same constitution, is capable of great relief by the same means. The systematic use of cold ablution fortifies the nutritive processes against the encroachment of these insidious diseases. It is a most common thing to observe, that boys of a sickly, delicate constitution, in a few years, by the aid of a sea life, become hale and hearty seamen; and this is as much attributable to the washings of the sea as to its breezes.

It almost seems superfluous to add, that general ablution, properly applied, must be most beneficial in chronic debility of the skin, and therefore, also in the disorders dependent upon it. Liability "to catch cold" is not to be cured by closed doors, or double-quilted waistcoats; it is the indulgence of the morbid sensibility of the skin, which, while continued, renders its relief impossible. In no case is this chronic de-

* Venous, or black blood (*i. e.* blood deprived of oxygen in its course through the smallest arterial blood-vessels), so far from being nourishing, is poisonous. It causes death, in drowning, and in suffocation. It is the lungs which, by supplying oxygen, change the black blood into red.

bility more manifest than in some of the severest forms of asthma. Numerous writers concur in affirming, that nine attacks out of ten result from *cold* applied to the skin : that it is indeed catching cold which induces these attacks. A man, struck with asthma, feels as if his chest were encased in cast iron. All his muscular energies are concentrated in the act of breathing ; the nervous centres are at fault ; and they are influenced, through reflex action, by the disorder of the nerves of the skin. Hence it has been found, that the cold bath, during the intervals of attack, is a sovereign remedy against some of the worst forms of asthma. That shock of cold water, which causes the chest to sob and heave mightily for breath, may well unlock the straitened breast of the asthmatic invalid. That crimson glow which blushes over the whole surface of the bather, may well teach, at last, the torpid skin to acquire new powers of discharging the functions of reaction.

We cannot, then, too highly value the importance of a reaction which, by withdrawing a large volume of blood from internal organs, directs it to circulate in a new field, within the structures of the skin. *Deep-seated disorders, caused by congestion of blood, vanish as by a charm, when that blood can be trained permanently to circulate freely, equally, and vigorously at the circumference, instead of oppressing the centre.*

The sketch here given of the internal changes suddenly produced by the impression of the cold bath are suggestive of the slower influences of climate, in all its vicissitudes of cold and damp, upon the vital actions of the frame. The disturbance of the balance of the circulation, in proportion to its duration, is a

most influential condition in a vast majority of the diseases of man. Unequal distribution, fullness, stagnation, or excessive determination of blood to particular parts, constitutes a state of *passive or active congestion* in the blood-vessels, and congestion in any organ cannot long exist without disease. Determination of blood to a particular locality may be rapid, but its effects are often singularly lasting. Witness the effects of extraordinary muscular exertion under unfavorable pressure, as a tight cravat, or a closely laced boddice.

Congestion may be slowly or rapidly induced. An over-worked, over-stimulated brain, at length loses its normal tone. A rush of blood to the head takes place under trivial excitement, and the brain falters in its former powers of concentrated thought.

Blushing is a most instructive example of the influence of nervous power upon the circulation of the blood. Physiology teaches the ultimate causes of this interesting phenomenon.—Every artery, however minute, is surrounded to its termination with innumerable nerves and ganglions, each resembling *little brains*. These nerves maintain a certain tone, elasticity, and force of contraction, which prevent the arteries from swelling under ordinary circumstances; but they suddenly lose some supply of nervous influence by excess of emotional action at the great centres; at this moment, the vessels, being deprived of their customary nervous tone, are dilated by the force of the blood. Hence the active determination of blood summoning the mantling blush.

Now, when the nervous centres similarly cease to supply the blood-vessels of any part with the necessary

tone or power of contraction, these vessels admit more blood than they ought to do. Under strong emotions, which, as it were, expend nervous energy at the great nervous centres, especially those about the heart and stomach, a similar blushing or rush of blood may be developed at any predisposed part; and when the tone of the great blood-vessels is reduced, then palpitation, shortness of breath, giddiness, &c., &c., supervene. We see then how congestion may follow exhaustion.

Again, A, B, C, D, in a state of perspiration, on a sporting excursion, are exposed to a keen wind, or get thoroughly drenched with rain; A is seized by a fever, B catches bronchitis, C an attack of congested liver and bilious fever, while D escapes. A, having no particular organ predisposed to disease, suffers a general reaction, called fever. B suffers from congestion of the blood in a predisposed mucous membrane of the lungs: and C from a similar disorder in the circulation of the liver. There was a *general* application of cold and wet producing very different effects. Hence there were the same exciting but different predisposing causes. But what is more extraordinary, a healthy person will commonly escape any ill-effects from riding on a coach or open carriage in a general draught of air, but sometimes be made ill from a trifling *local* current of air, by riding in a partially closed carriage.

Without amplifying these illustrations, it is evident that whatever causes largely and permanently disturb the circulation of the blood, must gravely affect the general health. That impressions of damp and cold, and local draughts of air, by depressing the circulation

within the skin, produce a determination of blood upon the internal organs; the mucous membrane of the lungs and digestive canal, as well as the liver and kidneys, &c., being each liable to congestion according to individual predispositions.

Congestion, either active or passive, then, is a common result of atmospheric changes. But as the same changes do not produce, in all persons, similar effects, there must be other circumstances which control these results. Upon investigation it will be found, that in proportion as the circulation within the skin is liable to be arrested by cold and damp, so are its various functions also liable to be deranged, and that the skin regulates, to a wonderful extent, the changes going forward within the body, in the processes of secretion, digestion, absorption, circulation, and nervous action.

Now, England is particularly remarkable for rapid atmospheric changes and sudden alterations of temperature. The reports of the Registrar-General show an extraordinary increase in visceral affections, corresponding to sudden variations in temperature, especially if the air is loaded with moisture, and few countries are more notorious for diseases of the lungs than England. There can be no doubt, therefore, that variable degrees of cold and moisture are in some way connected with the prevalence of disorders of the chest. They stand in the relation of cause and effect, *and the condition most favorable to their full operation is a neglected state of the skin.*

In cold countries, a debilitated state of the skin causes, in the most direct manner, disorders of the respiratory organs, for two reasons.—First, because the cold air predisposes the mucous membrane of the

lung to such attacks; and secondly, because the obstructed secretions of the skin, being thrown back into the blood, find the lungs already predisposed to inflammation. On the other hand, in hot countries, a debilitated state of the skin, arising from excessive action, by reason of the intimate sympathy between the skin and the mucous membrane, causes, in a direct manner, the organs of digestion to be liable to derangement; and hence, the liver complaints, bilious fevers, and dysentery of hot climates. Calculous disorders are very common in England, but extremely rare in the West Indies; facts which exactly correspond to the diminished action of the skin *here* and its increased perspiration *there*.

An officer was ordered suddenly to repair from this country to Jamaica, under very peculiar circumstances. He was just about to undergo "an operation for the removal of stone." After residing some time there, every symptom of his complaint vanished.

The absurd neglect of the requirements of the skin, when continued for a series of years, cannot fail to impair its functions, and so render persons, in the prime of life, liable to distressing disorders of the lungs. For, in our changeable climate, what are generally the most fatal diseases? Pneumonia (inflammation of the lungs), and consumption; and, in elderly persons, bronchitis, without including epidemic diseases, which, though produced by specific causes, are yet aggravated by the suppression of the natural excretion of the skin. But can any one doubt that, had the skin been less debilitated, the tone of the minute vessels of the skin been more permanent,—had the nervous tissue been less excitable and more

efficient in function,—can any one doubt whether this pneumonia or that obstinate bronchitis would not have been more easily warded off? The debility of the skin tells in two ways: first, by its inability to sustain external cold with impunity, and secondly, by its incapability of being stimulated by medicines to that degree of action which frequently alone can save the patient. A feeble organ with its enfeebled vessels and irritated nerves (and irritability, by a physiological law, always increases by debility) is too often incapable of sustaining the full curative action of a powerful remedy, such, at least, as is necessary to save life. Accordingly, it frequently happens that, when people die of “a cold in the chest,” under medical treatment, this event generally results, not so much from unskilfulness on the part of the practitioner, as from the inability of the weakened organs to respond to, and carry forward, the salutary actions of the remedies. Let all those, therefore, who delight in the comforts of flannel and warm fires and close apartments, remember that a period of life may be approaching, when some distressing affection, arising from a debilitated state of the skin, may cause them to regret that neglect of its demands, which shall then have principally contributed both to the inveteracy and acuteness of their sufferings.

We would here, then, be understood, not to deprecate a proper attention to clothing, but a dangerous neglect of the habitual state of the skin; a very common oversight. And though an enduring source of chilliness must ever be fraught with danger, still the practice of many invalids carefully to seclude themselves from cold air, in every possible way, cannot be

too highly censured. For, by such indulgence, the skin becomes more and more sensitive, and continually less able to discharge its proper functions.

The victims, indeed, of excessive abuse of protective clothing and warm apartments, acquire, at length, extraordinary meteorological properties. They can apprise you that an east wind is become prevalent in the night, that a deep snow is at hand, or a thunder-storm brooding. In fact, their susceptibilities to changes of weather render them the victims of every keen blast, and at last they derive a gloomy pleasure in watching the fall of the barometer and foretelling their approaching ailments, with all the tenacity of the hypochondriac.

But though an eloquent and still fashionable declamation, on "stomach difficulties" and its outrageous abuses, ascribes a thousand ills to INDIGESTION, and complacently lays so much blame on the stomach, yet the skin is often far the worse-used organ of the two, when the relief of an obstructed condition of the skin will do more to relieve the dependent indigestion of the stomach than any amount of mere stomachic treatment. Perfect digestion is impossible while the skin is wholly debilitated.

Nature, indeed, inflicts a keener punishment for neglect of the skin, the safety-valve of the constitution, than for long-continued abuse of the digestive powers: a result necessarily according with the opposite duties which they are destined to fulfil in the scheme of organic life. The stomach feeds the blood. The skin relieves it of putrefactive particles, which, when retained in the system, are of a highly combustible nature; particles which, largely gathering in the

frame, are apt to fire the system with inflammation whenever the kindling spark is in any way applied. The skin cannot, like the stomach, admit of interrupted function without a general constitutional disturbance. It is one thing to fast and another thing to surcharge the blood with poisonous elements; one thing to run short of fuel, and another at a lively heat to shut down the *steam* of Nature's engines. No wonder she is apt to explode her force upon some tender part of her machinery.

The stomach good humouredly bears an incredible amount of ill-usage at a luxurious table, yet, with a little rest, light work, and perhaps a cooling seltzer and sherry draught, recovers again and again from an outrageous indulgence. But the skin, on the contrary, even upon slight exposure to a draught of air, or to wet and cold, often extorts a penalty for the imprudence, which either strikes a death-blow or renders life burdensome and blighted to the latest hour of existence.

On such grounds, we believe, close attention to the state of the skin, by the people of England, will do more to protect them against those diseases peculiar to its variable climate than all other measures whatsoever. We cannot but think that an organ is important in proportion to the high degree of its organization, *i. e.* the amount of its blood-vessels, extent of its sympathetic relations and peculiar endowments; conditions eminently fulfilled by the human skin. On such accounts, even temporary changes in its physiological state produce effects, not only of a very profound character at the time, but calculated to tell upon the future state of the constitution. Hence, it is most common to hear patients refer their sufferings

to distant periods when they somehow caught a severe cold. But the great importance of these considerations will become more evident by adverting more closely to the structure, functions, and endowments of the skin.

In structure, it consists of three layers. The deepest is a stratum of minute blood-vessels, less than the thousandth part of an inch in diameter, amongst which are interwoven innumerable twigs of nerve-fibre. A middle layer is distinguished by a germinating membrane, which continually produces successive crops of minute scales, which form the scarf-skin of the external surface. These scales, at first, however, are true cells, *i. e.* minute sacks, or bags, formed of a membrane enclosing a fluid. But as the successive crops rise and push forward the outer layers, from within outwards, these cells, drying by evaporation, at length form a compact scaly pavement, of an elastic, flexible, and *porous* character, viz.—the epidermis, or external skin, (the same which is raised by a blister or a burn); the pores here alluded to being the mouths of the perspiratory ducts. The chief points to be observed in this imperfect sketch are—

I. The extensive character of the blood-vessels of the skin.

II. The nervous endowments, affording a means of affecting the mind by sensation, and the internal organs by sympathetic action.

III. Provision for a constant renewal of a new scarf-skin, by means of a germinating membrane.

IV. Extensive contrivances for conveying away a secretion of the blood. Each pore of the skin is the open mouth of a duct, which proceeds from a secreting

gland placed in immediate contiguity to the cutaneous blood-vessels before mentioned.

It is therefore plain that the functions of the skin may be disordered in four principal ways, besides the various complications.

The most common form, however, of derangement, consists in debility of the vessels of the skin, accompanied by increased sensibility and consequent irritation of internal organs, together with inadequate or improper activity of the perspiratory system.

Whence arise the chilliness, the partial heats, coldness, and odd sensations experienced in the skin, and the deficient or unnatural character of the sensible perspiration? Whence, also, the rapid manner in which impressions, made upon the surface, are communicated to other parts? In consequence of the sluggish excretion of the insensible perspiration, chronic ailments are frequently aggravated, and when these various functions are much deranged, sympathetic fever is a certain result. Rheumatism, gout, and various forms of inflammation, are then developed, according to individual predisposition. It sometimes, however, happens that the skin is both the *cause* and *seat* of the disorder; in this case, a skin disease of an exceedingly obstinate character is set up. Far less difficult of cure are those *skin* diseases which have their origin and maintaining cause in the organs of digestion, or in a faulty condition of the blood. For when a person suffers from some cutaneous affection traceable to a curable disorder of the blood, or internal organs, he has a far better prospect of relief than when no such constitutional or digestive derangement can be discovered.

After what has been advanced there can be little difficulty in understanding the extraordinary influence of the physiological condition popularly termed "catching a cold." The consecutive phenomena are familiar to every one. A highly organized surface, like the skin, is capable of instantly suspending its functions. The impression of cold contracts the cutaneous blood-vessels, the skin itself also contracts and roughens—the minute hairs become erect ("goose skin" appears). The secretion of perspiration, depending, like all others, upon the presence of arterial blood, stops; at the same time the blood of the surface is thrown upon internal organs, and the great nervous centres are strongly impressed; should this state of things last for any time, and the nervous and circulating systems be feeble, reaction is brought about only after a considerable interval; persons who have taken a severe cold usually experience much chilliness for a considerable time, and in general the duration of the chill is proportionate to the severity of the attack about to follow; at last comes the reaction, with all its attendant symptoms. Experience, however, shows that even a severe cold may often be arrested, provided this state of chill has not been long established. The sooner a reaction can be effected the less mischief will ensue. In some cases, a "stiff glass" of brandy and water, and a hot bed, and a basin of hot gruel instantly brought into requisition, will often work a marvellous cure in the case of a recent chill. We may form some idea of the injury caused by immediately checking perspiration, by the experiments of Lavoisier and Seguin. The skin, according to these philosophers, discharges, in health, eight

grains per minute, or about two pounds in the twenty-four hours. Now, as all secretions destined to be constantly discharged prove deleterious if retained in the system, no one can fail to understand that the functions of the skin cannot be long arrested without more or less illness resulting; therefore, so long as the chill lasts, the noxious matter which ought to be thrown out is being retained, and therefore accumulating in the general mass of blood, and this affords a ready explanation of the serious inflammations resulting from such causes.

"I counted," says Mr. Erasmus Wilson, "the perspiratory pores in the palm of the hand, and found 3528 in a square inch; now each of these pores being the aperture of a little tube of about a quarter of an inch long, it follows that, in a square inch of the skin on the palm of the hand, there exists a length of tube equal to 882 inches, or $73\frac{1}{2}$ feet; surely such an amount of *drainage*, of 73 feet in every square inch of the skin, assuming this to be the average of the whole body, is something wonderful, and the thought naturally intrudes itself—what if this *drainage* were obstructed?" "The number of square inches of surface in a man of ordinary height and bulk is 2500; the number of pores, therefore, is 700,000, and the number of inches of perspiratory tube 1,750,000, that is, 145,833 feet, or 48,600 yards, or nearly 28 miles."

A gentleman, after severe exertion, which had induced a copious perspiration, had immediate occasion, very lately, to superintend some business in his own cellar; remaining there but a short time, he caught so severe a cold that an inflammatory fever, the result of the chill, destroyed him in a few days. He had

only recently returned from his wedding tour. Here it is to be remarked, that the nervous action, secretion, and circulation, having their functions debilitated by temporary fatigue, were rapidly yet deeply compromised by the chill of a damp cellar. The intense inflammatory reaction overpowered the vital forces. A delicate person, suffering from debility of the skin, without the exhaustion of fatigue, might experience a similar result from emerging from a warm room to stay in a cold cellar.

The sympathetic endowments of the skin are of no less importance than its excretory properties. Depending on the mysterious agency of vital currents or upon some influence for which we possess no method of appreciation, except by the phenomena of life, the transmission of impressions received by the sensitive parts of the skin are as instantaneous as they are inscrutable. Why should titillation, or tickling of the skin, cause death, or a burn prove fatal? A result which could hardly be expected from the amount of surface injured. How is it that persons have been able to remain unhurt in large ovens, while flesh, deprived of life, underwent a rapid roasting, and yet with scarcely any increase of the temperature of the bodies of the experimenters? Why should a few sprinklings of cold water revive a person from a fainting fit, and a ducking dissipate intoxication? The American mode of rescuing from poison by opium is an extraordinary instance of the influence of the skin upon the conditions of internal organs. Our American brethren had recourse to a relay of powerful flagellators, who took their turn, for some hours, in

thrashing a person to life who was poisoned with laudanum. Equally extraordinary is the fact that some persons who are subject to epileptic fits have occasionally prevented an attack by tightly tying a finger, or a limb, which warns them by the "aura epileptica" of the rapid approach of the fit. Such facts abundantly prove, upon whatever principle they are capable of explanation, that the skin possesses a vast influence upon the internal economy.

" My beautiful,
My only Venice, *this is breath!*—Thy breeze,—
Thine Adrian sea-breeze,—how it fans my face :
Thy very wind feels native to my veins
And cools them into calmness. How unlike
The hot gales of the horrid Cyclades,
Which howled about my Candiotte dungeon, and
Made my heart sick."

Every one will feel the truth of this beautiful embodiment of *the same principle*, in the above lines of Byron.

Modern physiology, however, discovers that every microscopic nerve-fibre of the surface is, as it were, a telegraphic wire, not only communicating with the brain, but with the great central stations of the nervous system for the distribution of nervous energy. In short, that powerful impressions can be made upon these centres through the sympathies and sensibilities of the cutis, or true skin, which can hardly be accomplished in any other way. The whole *rationale* of *counter-irritation*, and the philosophy of baths and bathing, whether in simple, medicated, or mineral water, are founded upon this fact. No principle is more available in medicine than that brilliant discovery of Marshall Hall,—the reflecting functions of the nervous system. The connection of the nerves

of the skin with those of respiration is one of them. By this principle we can understand why the daily use of the shower-bath will often do more than all other remedies to restore easiness of breathing to a feeble girl suffering from nervous debility alone, who cannot mount an ordinary staircase without severe oppression of the chest.

This reflex function is illustrated by tickling the foot of a paralysed leg, which may be made in this way to start, although the patient cannot make it move by an effort of the will.

By the same sympathetic action between the skin and the lungs travellers, who are much exposed to currents of air, naturally respire a greater amount of air than the sedentary living in a still atmosphere; the impression of the air stimulates the lungs to increased action. Even invalids who are unable to take exercise find their breathing easier and deeper in a fresh atmosphere; hence the importance of their being much in that kind of open air which never stagnates. The same sympathy may be observed in the convulsive efforts of the chest caused by the first plunge in the cold bath. The fanning of fresh air upon the same sympathetic principle revives the trembling heart of the invalid, relieves his panting chest, and refreshes all his powers. The air, entering the lungs, crimsones the black and languid tide returning to the heart, by the agency of oxygen, and there ventilates the vital stream. But more than this, the nerves of the skin, intimately connected with the mechanical action of the chest, receive a stimulus from the fresh air, and thus cause the breast to heave with increased appetite and aerial enjoyment. This also is effected through the great nervous centres by reflex action.

On the principle already advanced, as excessive action leads to debility, the livers of persons who have resided long in hot climates become very commonly debilitated. There are other reasons, no doubt, for this result, but this may fairly be assigned as a sympathetic cause.

Dr. Watson, in his celebrated lectures on the practice of physic, has very strikingly pointed out the connection between the *liver* and the skin. Indeed, the promotion of a free action in the skin often affords, in cold countries, the means of rousing a torpid liver into a state of activity. The skin has also special relations to the mucous membrane of the alimentary canal. In fact, their disorders often appear reciprocal. To grooms it is a well-known principle, that the state of the horse's "coat" is a sure criterion of that of the stomach; experience has taught them the value of this; continued friction of the skin will often restore the jaded horse after a long journey when all other means fail.

If we contemplate the manifold endowments of the skin,—That it possesses an exquisite sensibility, not only of touch, but for transmitting the impressions caused by atmospheric changes, to the great nervous centres,—that these centres possess the wonderful property of reflecting these impressions received through the skin upon the various internal organs, and so changing their vital actions by means of the sympathetic nerves,—that in this way even the secretions and circulation of internal organs may be gravely affected through the skin,—then we must admit that such external influences, whether arising from changes in the weather, or from exposure to damp and cold,

must be peculiarly apt to tell upon the general health in a weak, relaxed, or debilitated state of the skin. And this argument acquires greater force from the well-known fact, that where there is want of nervous tone the nerves are more easily affected by exciting causes.

Whenever the state of weather is opposed to the free evaporation of the insensible perspiration, in persons suffering from debility in the functions of the skin, and whose mucous membrane is also delicate, then watery or bilious diarrhœa, if the liver sympathises, becomes very prevalent. Continued cold moist weather is the common precursor of such attacks. On the other hand, those whose blood circulates vigorously in the skin in spite of the weather, escape an attack of the prevailing disorders; whilst others, who offer little cutaneous resistance to atmospheric influence, and are predisposed to rheumatic, gouty, gravelly, or catarrhal affections, experience a repetition of their former ailments.

CHAPTER III.

DEBILITY OF THE SKIN AS CONNECTED WITH OBSTRUCTED PERSPIRATION.

THE disastrous consequences of interrupted perspiration are forcibly illustrated by its destructive operation on vegetable life.

“All flesh is grass.”

And the vital prosperity of both, by a natural law, is poised delicately upon the same meteorological

balance. Pestilence, as well as famine, follows in the track of blasting blights—

“For oft engender’d by the hazy North,
Myriads on myriads insect armies warp,
Keen in the poison’d breeze; and wasteful eat,
Thro’ buds and bark, into the blackened core,
Their eager way. A feeble race! yet oft
The sacred sons of vengeance; on whose
Course corrosive famine waits, and kills the year.”

Whilst, on the other hand, nothing more contributes to healthful life than a salubrious condition of Nature “in verdure clad;” when

“Sickly damps, and cold autumnal fogs,
Hang, not relaxing, on the springs of life.”

The subject has been so well handled by Dr. Hales, above a century ago, that Baron Liebig quotes his observations on the effect of obstructed perspiration at considerable length.

Dr. HALEs calculated that an acre of hops, in twelve hours, perspired, in a kindly state of the air, about 220 gallons of moisture. “But in a rainy moist state of the air, without a due mixture of dry weather, too much moisture hovers about the hops so as to hinder, in a good measure, the kindly perspiration of the leaves, whereby the stagnating sap corrupts, and breeds mouldy *fen*, which often spoils vast quantities of flourishing hop-grounds. This was the case in the year 1723, when ten or fourteen days’ almost continual rains fell, about the latter half of July, after four months of dry weather, upon which the most flourishing and promising hops were all infected with mould or *fen*, in their leaves or fruit, whilst the then poor and unpromising hops escaped, and produced plenty; because they, being small, did not perspire so great a quantity as the others; nor did they

confine the perspired vapour so much as the large thriving ones did in their shady thickets. This rain, on the then warm earth, made the grass shoot out as fast as if it were in a hot-bed, and the apples grew so precipitately that they were of a very fleshy constitution, so as to rot more remarkably than had ever been remembered."

"I have, in July (the season for fire-blasts, as the planters call them), seen," says HALES, "the vines in the middle of the hop-ground all scorched up, almost from one end of a large ground to the other, when a hot gleam of sunshine has come immediately after a shower of rain; at which time the vapours are often seen with the naked eye, but especially with reflecting telescopes, to ascend so plentifully, as to make a clear and distant object become immediately very dim and tremulous. This is an effect which the gardeners about London have too often found to their cost, when they have incautiously put bell-glasses over their cauliflowers, early in a frosty morning, before the dew was evaporated off them; which dew, being raised by the sun's warmth and confined within the glass, did there form a dense, transparent, scalding vapour which burnt and killed the plants." BARON LIEBIG remarks that "when these observations are translated into our present language, we perceive with what acuteness HALES recognised the influence of evaporation on the life of plants. According to him, the development and growth of the plant depend on the supply of nourishment and moisture of the soil, which is determined by a certain temperature and dryness of the atmosphere. The absorbent power of plants, the motion of their sap, depends on evaporation; the

amount of food necessary for their nutrition, which is absorbed, is proportional to the amount of moisture given out (perspired) in a given time. When the plant has taken up a maximum of moisture, and the evaporation is suppressed by a low temperature, or by continued wet weather, the supply of food, the nutriment of the plant, ceases, the juices stagnate and are altered; they now pass into a state in which they become a fertile soil for microscopic plants (the fen, or mould). When rain falls after hot weather, and is followed with great heat without wind, so that every part of the plant is surrounded by an atmosphere saturated with moisture, the cooling due to further evaporation ceases, and the plants are destroyed by fire-blast or scorching." LIEBIG applies the same explanation to the potato rot. Thus, the blight of the hops, and the potato rot, appear, in many cases, to depend upon *obstructed perspiration*.

If such, indeed, be the pernicious effects of obstructed perspiration on plants, we may infer, from the large provision made for the elaboration and discharge of perspiration from the human skin, that its obstruction cannot be less deleterious to human health.

Nature, which does nothing in vain, requires, in health, that a great variety of products shall be constantly exuded by the skin. Professor Thompson thus enumerates their ultimate components:—

<i>Carbonic Acid.</i>	<i>Muriate of Soda.</i>
<i>Hydrogen.</i>	<i>Sulphate of Soda.</i>
<i>Nitrogen.</i>	<i>Phosphate of Lime and Iron.</i>
<i>Acetate of Ammonia.</i>	<i>Lactate of Lime.</i>
<i>Carbonate of Soda.</i>	<i>Lactate of Potash.</i>
<i>Phosphate of Soda.</i>	<i>Lactate of Magnesia.</i>

It seems, on a casual glance, that health is simply impossible while the purifying functions of the skin remain inactive. Death, indeed, must speedily result, unless some internal organ can, for a time, undertake the duties of the torpid or obstructed skin, in addition to its own; a compensating action which, in time, must break down the vigour of any organ, however healthy. It is thus that cutaneous debility at last deranges the internal secretions and circulation of the blood. For the oversensitive and treacherously debilitated skin cannot always bear up against depressing atmospheric impressions. But further evidence for giving force to these considerations will be elicited by considering the intimate structure and action of the perspiratory gland, and how consummately Nature has adjusted minute means to a great end, *the ventilation of the blood*, by nearly a million of such glands, accompanied by many miles of nerves, vessels, and ducts, distributed in the human skin.

Let us employ an artifice to illustrate the complex structure of one of these glands. Imagine, then, a white thread, an inch or two long, twirled, at one end only, between the fingers, into a little ball. Let this represent the perspiratory tube of the gland, terminated by a *pore* at the surface of the skin. About this, convolute another thread so dyed as to show one half red and the other half blue, to represent the minute microscopic artery of the gland losing itself in the continuous vein. Lastly, surround the thing with a network of yellow silk, as a representative of that portion of the nervous system which controls the action of the gland. This conglomeration, on a large scale, it is true, is a perfect skeleton-likeness, as it were,

of the skin gland, and it is a type of every secreting gland in the human body. The elaboration of the perspiration depends, then, upon an uninterrupted flow of arterial blood through the glands; upon the filtration from the blood into the perspiratory tube, of *precisely* those products which, in health, are destined to be got rid of; upon the freedom of the tube itself, from obstruction throughout its whole length, and the unsealing, if necessary, of its closed pore; and lastly, upon the due supply of nervous influence, to regulate both the size of the capillary vessel, and to insure the integrity of the secretory action of filtration.

In glandular torpor of the skin much may be required to be done in order to restore obstructed perspiration which neither cold nor warm bathing has accomplished. In addition to cleansing, softening, and relaxing the skin, by warm bathing, improving the tone of the nervous centres and circumference, by colder applications, an energetic agent for exciting, soliciting, or reproducing the retained secretion of the skin, is of the last importance. Vapour bathing, under judicious control, is one such means which, in some cases, surpasses all others. We have had opportunities of remarking the action of vapour baths, to a large extent, during seventeen years, and have noticed a singular agreement among bathers in their description of its peculiar effects upon themselves—as relieving them of a sense of internal load, incubus, or oppression, which had previously haunted them for many years; a result, doubtless, attributable to the constitutional benefit accomplished by the depuration of the blood.

Greater relief is in general obtained when free perspiration is elicited at the lower temperatures, from 96° to 102° : at a greater heat the balance of the circulation becomes disturbed, the pulse quickened, the breathing hurried, and the blood in some cases is determined to the head. The promotion of evaporation from the surface is, in the use of vapour baths, the chief thing to be attended to. It is this which prevents the blood from being heated, quiets the pulse, refreshes the frame, and lightens the action of the chest. Rapid cutaneous evaporation quickens the absorption of both food and medicine, and especially of mineral waters. It is impossible in any tubular system of circulation to draw off fluids at one part without affecting the whole ; it is the evaporation from the leaves of plants which causes absorption by the roots, circulates the sap, and promotes their growth ; its obstruction which makes them languish. So is it with cutaneous transpiration. A vapour bath, which does not promote perspiration, loses its chief value. The bather must not mistake the condensation of vapour upon a cooler surface, for true perspiration ; marble monuments are sometimes said to *sweat* from a similar cause : with as much propriety might it be alleged, regarding the *dew* collected on the outside of a decanter of spring water introduced fresh from the well into a crowded assembly, that this dew exudes through the glass.

If the working classes expended one half of the capital on baths and cleanliness which they do upon quack medicines and drugs, the national health would reach a degree of stability unknown to the present unhealthy race. One of the grandest schemes for the re-invigoration of the public health is to be found

in the Act for establishing baths and wash-houses throughout the length and breadth of the land. The Cholera has startled our population into a new attitude of solicitude and sanitary inquiry. It is proved beyond all doubt, by overpowering evidence, that the cholera and epidemics in general spread and fasten upon their victims by a *law of selection*, determined by the previous infringement of the ordinary laws of health. Cholera is unknown in England 400 feet above the level of the sea, and is found more intense as the land is *lower, damper, more crowded with squalid, unwashed, and intemperate multitudes*; in fact, whatever depresses the vital functions, receives at last the full penalty of a sin against Nature. And it must be admitted as a general truth, that severe and intractable chronic diseases particularly depend upon causes both gradual, insidious, and profound. The same causes which are now beginning to play on the frame of a susceptible individual, by degrees may destroy him ten or twenty years hence. For all insensible influences, if in any degree hurtful, by continuance, gradually undermine the life. It is the constant dropping which wears away the rock.

Again, if the functions of the skin are so frequently impaired in this country, by culpable neglect of the most natural means of imparting increased vigour, viz., by warm and cold bathing, frictions, and inunction, this fact affords an intelligible explanation of the fatality of disorders of the lungs, and of the prevalence, in this climate, of gout, rheumatism, and urinary derangements. When the skin remains inactive and debilitated for a series of years, the mucous membrane of the lung is apt to assume an enfeebled and excit-

able condition. Not only does the membrane itself pour forth, from sudden "colds," excessive and unnatural secretions, but it becomes altered in structure, thickened, dilated, or contracted, and frequently gorged with blood. Constant attention to the skin is the most probable means of averting the approach to this state. It is now satisfactorily ascertained that the product called TUBERCLE, in the early stage of consumption, is a morbid secretion poured forth by the mucous membrane of the lung. This secretion, however, has the dangerous tendency, in certain conditions of the health, to adhere, concrete, and gradually forming little masses to blockade the minute air-cells of the lungs at different points. We have seen such tubercular deposits resemble perfect *casts* of the bronchial tubes. For a time, indeed, except shortening the breath, and giving rise to constitutional changes, these masses may lie, as it were, dormant: but no sooner does the surrounding membrane become irritable from taking cold, than the presence of these concretions in the delicate substance of the lung occasions inflammation, and next ulceration, leaving a cavity seldom healed. In this stage, tubercular deposits are frequently brought up in a fit of coughing.

The morbid secretion of the mucous membrane of the lung, called tubercle, comprehends some of the very elements which, in health, ought to be discharged by the skin. It is therefore extremely probable that when, in debility of the skin, these elements are retained in the blood, they are at length deposited in the lungs, and so cause consumption. And this may explain why consumption is so fatal in this country, because its vicissitudes of climate tell directly upon a

debilitated state of the skin, in arresting its proper secretions and throwing them inwards upon the lungs.

CASE I.—Severe chronic bronchitis with membranous expectoration, arising from a debilitated state of the skin.

During six months, an elderly lady (about 60), residing in Kent, experienced almost daily paroxysms of coughing, so violent as to threaten speedy suffocation. As a personal friend, we could not but feel interested in her case, especially as her physicians had extinguished hope of recovery. And feeling that her emaciation progressed, and that her attacks were followed by increasing exhaustion and rattle {within the chest, she resigned herself to what at the time appeared an inevitable fate. Her friends began to take their final leave. Being summoned from Harrogate to her residence, we stated, after a careful investigation, our firm conviction that her disorder had originated in debility of the skin. She had had, for years, all the signs of that derangement. For twelve months she had been under medical treatment, and confined to her bed-room during the last six months. The slightest chill of the surface induced an immediate paroxysm of coughing followed by the expectoration of a semi-membranous substance, resembling boiled bladder. It was the extreme difficulty of ejecting this secretion which endangered her life, while its gradual accumulation within the chest was no less to be dreaded.

The action of the skin was restored by means of systematic bathing, carried out twice a day, combined with frictions and stimulating lotions. At first a

single arm only, but by degrees a larger surface was subjected to this treatment, until the general surface was gradually accustomed to the process ; the early applications induced very severe attacks : in course of time, however, they diminished, and after pursuing the system laid down, with constant improvement for nine months, including a course of vapour baths, her lungs resumed their healthy action ; their extraordinary secretion ceased, and brisk exercise, even in cold windy weather, was borne with impunity. Her recovery was principally owing to the stimulation of the hitherto torpid skin.

In a large majority of cases delicacy of the lungs, except from hereditary pre-disposition, or malformation, or such evident causes, is owing to the debility in question. The very persons who are most liable to colds in general are those whose cutaneous circulation is feeble, who are very sensitive to changes of weather, whose perspiration is easily checked, and who readily experience chills of the surface ; in other words, they are victims of this debility.

There may be habitual debility by habitual neglect of the skin, or occasional debility by accidental depressing causes. In the latter case, persons enjoying excellent health become suddenly liable to the influences of damp and cold. Thus, in a state of fatigue, of excessive perspiration, or in temporary depression, either from late hours, mental anxiety, or dissipation, the possessors of robust health sometimes succumb to influences which up to that moment had been devoid of harm. In good health we all possess a conservative power of resistance ; when that power is temporarily enfeebled from any cause, our health is

no longer secure. Thus it is not necessarily true that the night air is dangerous; it becomes so when we are placed in circumstances which allow it to take an injurious effect. A person who, in a state of excitement, fatigue, and perspiration, plunges suddenly into cool night air, after the prolonged festivities of the dance, is as imprudent as that young man who, in an exhausted state on a hot summer's day, having dashed into a river to bathe, died of brain fever in consequence.

We may here mention the case of a lady of our acquaintance recently married. Her husband being accidentally detained on some business within his church, that unfortunate lady imprudently ventured to pass the time on a raw cold day in the churchyard. She received a fatal chill. Before many days had elapsed she was a corpse, destroyed by a low fever induced by a severe cold.

Persevering attention to the skin frequently cures a variety of complaints supposed to be dependent upon indigestion, such as gravel, tic douloureux, and palpitation of the heart of a functional character, and that, too, in a surprising manner, when other measures have been of little avail.

CASE II.—*Pyrosis or Water Brash.*

A clergyman had been subject to this complaint for five years; he had consulted a practitioner of great eminence for the treatment of stomachic derangements, and he had taken a good deal of medicine, especially mercury, prussic acid, and bismuth, but without success. The paroxysm generally attacked him after a meal, accompanied by a curious sensation

of grinding and contraction at the pit of the stomach, shortly relieved by the ejection of a considerable quantity of clear, tasteless fluid from the mouth. The occurrence of this during his professional engagements was highly distressing. Considering the little benefit which had been derived from a course of medicines highly appropriate, we strongly urged him to commence a systematic course of morning ablution in cold water, summer and winter, and have the satisfaction of knowing that this plan has been rewarded by his complete recovery. We had reason to believe that the skin was labouring under considerable debility.

CASE III.—*Severe urticaria (nettle rash), nervous headache, and tic douloureux.*

A young man of nervous temperament had suffered from attacks of urticaria of a very intense character for many years. According to his description, large wheals were raised upon the skin, of all imaginable shapes, white upon the convex surface, and surrounded by a reddish line of demarcation. These wheals at times appeared very suddenly and in various places. He stated that, sitting near the fire, or even in close proximity to burning candles, was sometimes a sufficiently exciting cause to produce an attack of the rash upon the face; when this occurred at an evening party he was obliged to beat a precipitate retreat, the eyelids, when affected, becoming completely closed by the swelling. The medical practitioner whom he had consulted strongly recommended him to adopt no medical treatment, "lest the activity of the remedies necessary to subdue the complaint might be injurious to his constitution." He had also been subject to

severe nervous headaches, by which the eyes became so sensitive to light, that during an attack he was obliged to sit in a thoroughly darkened room. After about two years from the commencement of the urticaria, he was seized, under circumstances of an anxious character, with tic douloureux of the cheek and scalp. The approach of summer afforded him but little relief; paroxysms of pain lasted several days, with intervals of a few hours of ease. No particular derangements were noticeable, except an exceedingly sluggish state of the skin, and an impossibility of inducing perspiration by exercise. The remedy most likely to remove this condition appeared to be sudorific vapour baths; he was therefore urged to make trial of half-a-dozen baths, by which he was relieved of all these complaints. The nettle-rash has not recurred, although it is some years since he adopted this course of baths. This case was the more decisive because no medicine was taken at the time, except a few simple aperient pills of a nature which could not account for these results.

Headache is one of the many disorders attendant upon chronic debility of the skin. This kind of headache is peculiar; attention to the organs of digestion is not sufficient to remove it: ordinary measures fail. Dr. Burder, in his able article on headache in the 'Encyclopædia of Practical Medicine,' has enumerated *nineteen* well-ascertained causes of *headache*. But he has omitted the cause in question, *chronic debility of the skin*. This kind of headache is brought on by apparently trivial circumstances. In a torpid state of the skin, when, indeed, it is never equal to the proper discharge of its functions, the refuse material of

organic action intended to be thrown out by the skin is re-dissolved in the blood. So long, however, as other excretory organs, as the lungs, kidneys, &c., are able to execute a compensating office, this dissolved refuse finds sufficient exit: but when any cause (as nervous impression, heat, or fatigue, surprise or excitement) suddenly obstructs this vicarious office of discharge, then these dissolved particles remaining in the blood may particularly oppress and, as it were, poison the brain.* Accordingly, we ought to expect that the restoration of the proper action of the skin will do more for the removal of such headaches, in debility of the skin, than any other measures whatsoever; for by so doing, we provide a new channel for the exit of the elements of the disease. The ventilation of the mass of the blood (so to speak) capable of being effected through the skin is immense. It has elsewhere been remarked that the total length of the perspiratory ducts is not less than 28 miles; but the length of superficial blood-vessels must greatly exceed this. So long as the elements of disease fail to be discharged through so extensive a system, health is held upon a very frail tenure. And the same cause, according to the pre-disposition of the body, may and does occasion a variety of complaints.

CASE IV.—*Severe headache.*

A gentleman, subject for many years to a most distressing headache, complained that, on a hot sum-

* This poisonous effect is so well recognised by the profession in the case of arrested secretion from the kidneys, whose secretory powers by no means exceed those of the skin, that the same reasoning appears fairly as applicable to the skin as to the kidneys.

mer's day, even a moderate walk generally induced so severe an attack as to incapacitate him either for mental or bodily exertion. Ascertaining that active exercise, even in the hottest weather, invariably failed to elicit perspiration, and that no other derangements demanded attention, we concluded that obstructed cutaneous function was the essential cause of his sufferings. Sudorific vapour baths were therefore prescribed; these had the desired effect of restoring the action of the skin, and in a few weeks removed this troublesome complaint, without having recourse to any other measures whatever.

We could advance other examples; but those already given will, it is hoped, be deemed sufficiently illustrative of the subject.

CHAPTER IV.

BATHS AND BATHING.

THE sea is the universal bath, establishing, by its general use, the medicinal value of saline bathing. Nature, however, has taught the shuddering sick to cherish their feeble frames by the aid of waters calmer, warmer, and less pungent than those of the boisterous, briny ocean.

He who neglects to avail himself of the bracing effects of bathing, is clearly deprived of a natural nerve stimulus which invigorates without a secondary depression. For the cutaneous nerves unused to

the stimulus, and the blood-vessels to the glow of bathing, become debilitated ; whilst the great nervous centres, unaccustomed to the distribution of energy demanded for the glow of reaction, sympathetically languish. In proof of this, it will be found on inquiry, that those persons whose skin remains pale and chilly after bathing, actually suffer from nervous debility, either in one form or another ; whilst, on the other hand, universal experience has shown that those in whom, after cold bathing, the surface remains generally warm, with a lively circulation, possess a vigorous nervous system. And, after all, it is too much forgotten in the present day, that the circulation of the blood depends not simply on the heart, but upon the nervous ganglions, which not only regulate the action of the heart, but the pulsation of every artery in the body. Nervous debility compromises, in short, all other vital actions whatsoever.

Considering, therefore, for a moment, that the nervous system takes so great a share in regulating the action of the heart, digestion, secretion, and sensitiveness to external impressions, we must admit that where general debility of the skin proves this source of tonicity to have been neglected, great benefit may be expected in a variety of disorders by adopting a systematic course of bathing, or frictions, such as the peculiarities of the constitution may demand.

We shall therefore proceed to notice the subject of bathing in general, and endeavour to give such directions as may guard against its improper use.

The celebrated German Professor, HUFELAND, shrewdly observes, "The most ignorant person is convinced that proper care of the skin is indispensably

necessary for the existence and well-being of horses and other animals. The groom often denies himself sleep and other gratifications, that he may curry and dress his horses sufficiently. If they become meager and weak, the first reflection is, whether there may not have been some neglect, or want of care, in regard to combing them. Such a simple idea, however, never occurs to him in respect to his child. Since we show so much prudence and intelligence in regard to animals, why not in regard to men?"

The various kinds of baths in use may be divided into—

Hot Baths . . .	98° to 110°	Steam Douche . . .	98° to 120°
Warm Baths . . .	92° to 98°	Vapour Baths . . .	90° to 120°
Tepid Baths . . .	82° to 92°	Air Baths . . .	85° to 120°
Cool Baths . . .	60° to 82°	Medicated Baths . . .	
Cold Baths . . .	33° to 60°	Mineral Water Baths . . .	
Shower Baths . . .	42° to 110°	Local Baths . . .	
Douche Baths . . .	33° to 110°	Fomenting Baths . . .	98° to 110°

THE HOT BATH.

The hot bath, stimulating violently, and apt to be followed by a sensation of exhaustion, heaviness, and general languor, with determination of blood to the head, is not in frequent requisition. Even a degree or two above 97°, in sensitive persons may occasion some of these ill effects. But when a vigorous derivation to the surface is instantly demanded, as in some spasmodic disorders, retrocedent gout, eruptions, ague, cholera, certain chronic skin disorders, and in some forms of rheumatism and paralysis, this bath, if judiciously applied, is very valuable. Yet the greatest precaution is necessary in applying so powerful a remedy as the hot bath.

THE WARM BATH.

The bather, reclining in a warm bath, experiences a luxurious buoyancy, and gentle stimulation of the whole surface. His breathing becomes softer and deeper, at the same time the circulation becomes more generally equalised; the heart beats also fuller and freer, though at first rather more frequently. A moderate degree of exhilaration is soon, however, the prelude to a secondary effect. After a few minutes the whole nervous system becomes soothed and refreshed; internal uneasiness diminishes, pain is relieved, irritation disappears, spasm relaxes its hold, digestion is improved, and biliary secretion augmented. By these effects the warm bath, besides softening the general surface and detaching thick layers of old scarf-skin, cleansing the pores and promoting perspiration, tends to strengthen and invigorate the frame.

It is placed on record, that several of the hot springs now in vogue originally owed their discovery to animals whose instinct directed them to their use for relief.

USES OF THE WARM BATH.

I. To remove fatigue, and tranquillise nervous irritability.

II. To relieve chronic rheumatism, contractions of the joints, skin disorders, partial paralysis, sciatica, and local congestions; to dissipate the cold stages of fever.

III. In a depraved state of the system, impaired nutrition, and deficient secretion, irregular circulation of the blood, indigestion, and in a torpid state of the alimentary canal—

IV. In almost every form of chronic irritation of the viscera, in chronic inflammation, and during a course of alterative medicine, with or without local or general bleeding—

V. In cases where general relaxation is required to be frequently accomplished, as during the passage of concretions, whether from the gall-duct or kidneys—in colic, whether from obstruction, or from lead or other poisoning—

VI. In convulsions of infants, in cramps or other sympathetic irritation, in neuralgia, and some disorders of females—

VII. In some acute inflammations, seconded by other treatment—THE WARM BATH has been found to be of eminent benefit. But the warm bath, it must be confessed, is unadvisable in a full habit of the body, if accompanied by inflammation.

CAUTIONS.—The warm bath is not to be used in a state of feverishness, with great heat, thirst, and dryness of the skin; nor during great debility, and a tendency to dropsy and fainting fits. And in gross habits, and fulness of blood in the head, or great obesity; also in persons liable to discharges of blood, especially spitting of blood, &c.; and in states of great excitement, disease of the heart, latter stages of pregnancy, and in active inflammation, it is generally improper.

GENERAL DIRECTIONS.

Conduct in the Bath.—The object of bathing varies according to particular cases; but persons who bathe for the first time should be aware of the danger of falling asleep, and for this purpose gentle frictions

with the flesh-brush, or a frequent change of position, will suffice. To remove the adherent scarf-skin, is another object to be accomplished by the friction; the use of Castile, or almond soap, is strongly to be recommended for this purpose. Those who suffer from headache will do well to avoid reclining in the horizontal position while remaining in the warm bath.

The most available heat for the warm bath is 97° or 96° of Fahrenheit's thermometer; but every one, on taking a bath, should carefully regard the temperature. If the bath has been recently heated, the heat is liable to be rapidly reduced; so that before the usual time of bathing (twenty minutes) has elapsed, the water frequently cools several degrees, and this decline of temperature is apt to induce some kind of cold, or other ill effects which it is unnecessary to mention. A floating thermometer should be constantly employed. So dangerous is it to admit the hot water, without great precaution, that a gentleman was found dead in a hot bath, not long since, in London, literally *boiled*. He had turned on the hot water, and expired in a fit.

Doubtless, to render bathing as agreeable as possible, the bather should neither be harassed, nor greatly fatigued, neither fasting, faint, nor full, neither very cold nor very warm. He should be calm, cool, and comfortable. The water ought to be pure, fresh, and very soft, and if it have a dash of saline matter, so much the better.

Time for staying in the Bath.—From twelve to forty minutes, according to the effect desired, and the strength of the patient. In this country, to remain long in the bath is not common, although some of the

most remarkable cures abroad have been accomplished by bathing during many consecutive hours (from two to ten hours). Protracted bathing, however, can only be comfortably endured in a large body of water ; and any one desirous of staying longer than usual in a warm bath, will do well to choose a bath as capacious as possible.

The time for Bathing.—Saline absorption by the skin, when this result is desirable, is effected more speedily before breakfast. The best time for warm bathing is about two hours after breakfast, or, if lunch be taken, two hours before dinner. Bathing at night is, in general, improper, except where perspiration is intended, when an immediate removal to a warm bed, with warm drinks, will much promote that object ; without this management it is apt to have a heating effect at night.

After bathing, as a general rule, gentle exercise (and in the open air in fine weather) is advisable ; in very cold weather it is prudent to remain within doors for an hour after the warm bath, unless it be followed by a shower bath, or the bath of itself be highly stimulating to the skin. It is hardly necessary to add, that an obstructed state of the organs of digestion is sometimes opposed to bathing.

Frequency of Bathing.—Warm baths cannot in general be taken every day with benefit ; three or four times a week are, in most cases, sufficient, but so much evidently depends on the nature of the water, on the bather's constitution and peculiar disorder, that a general rule is impracticable. If, on the other hand, the kind of baths used be very much *varied*, then several may be salubriously taken daily, accord-

ing to circumstances; and some disorders yield in this way, for which two or three baths, taken weekly, would afford very inadequate relief.

THE TEPID BATH.

Neither at once surprising the system into a glowing reaction by the sudden shock of a cold bath, nor stimulating the surface of the body by a genial warmth, the *Tepid Bath*, being much cooler than the blood, produces a series of physiological changes in the bather, which vary in so eminent a degree, according to his constitutional vigour, that its secondary effects as well as its first impressions may prove either hurtful or medicinal. The great difference between the action of the warm and of the tepid bath will be manifest, by considering that the tepid bath slowly tends to subtract from the heat of the body, while the warm bath slowly tends to increase it. But Nature, endowed with a principle energetically conservative, has constituted a standard of action from which the vital functions cannot with impunity depart; and the condition most essential to her various processes is a certain uniform temperature of the blood. Temperature is a question of life and death with her. Hence she puts forth her whole energies to conserve the normal warmth, whenever the body is in danger of being cooled below the healthy standard. Still these energies will take effect either rapidly or tardily, according to individual vigour. But as the good conducting power of water abstracts vital heat, in the tepid bath, and necessitates its *increased* generation, a *reaction* must slowly take place, which, however, in

a remarkable degree, depends on the hygienic state of the bather, and the exercise taken in the bath.

It seems a wonderful fact, that while a person in robust health may frequently use warm baths as a refreshing and healthy luxury (94° to 98°), yet the same person cannot, in general, escape feverishness and other unpleasant results from a similar use of tepid baths. Dr. Robertson, in confirmation of this, declares, when speaking of the tepid Buxton water, (82°)—"It may be fearlessly said, that a man in health cannot bathe in the waters at Buxton for more than a very few successive days, without bringing on a degree of excitement that will amount to disease and require medical treatment accordingly." We do not quote this passage with any view to disparage the Buxton waters, for no one doubts their great value in many chronic diseases, but bring it forward as an example of the peculiar effect of tepid baths. The Buxton water, however, is so weakly saline (15 grains of salts in the gallon), scarcely differing from ordinary spring water, that we agree with Dr. Robertson, that its chemical composition is inadequate for explaining the disturbance produced in a few days on a healthy man.

Tepid bathing is not to be trifled with, either by the robust or by invalids. Its manifest medicinal power consists in gently lowering the temperature, and thus *soliciting* a slow reaction. By degrees, a delicate invalid who cannot bear the shock of cold water may be so bathed as to develop a gradual and increasing reaction.

When the bath is more decidedly saline than at Buxton, there is a greater stimulation of the surface,

and a more speedy reaction may be expected. The strongest in use are tepid sea-water baths. In summer, the sea, however, never becomes, strictly speaking, tepid ; it may be said to be cool. It is no uncommon thing for persons to resort to the sea, in the height of summer, with the erroneous idea of *tepid* sea bathing. And tepid baths, artificially heated, are, indeed, recommended as a preparatory measure. Yet very ill effects may unexpectedly arise, and that not seldom, from tepid bathing.

A gentleman (aged about 40) was advised by his physician to take tepid sea baths, at Scarborough, in order to prepare himself for sea bathing. After emerging from his first bath, in which he had remained during the time ordered, he was seized with an attack of shivering, prostration, and exhaustion. Bathing again as before, another attack, much more violent than the first, so greatly terrified him, that he at once relinquished all idea of continuing the baths ; and as for sea bathing, it appeared quite out of the question. This gentleman requested our opinion as to the possibility of bathing again ; by adopting a different course of baths he became enabled to bear, in a few weeks, cold, douche, shower, and other kinds of baths, with benefit and pleasure. There could be no doubt that the extreme debility of the skin had been entirely overlooked in ordering the tepid sea baths. Invalids, indeed, are often greatly surprised at the effects of tepid baths upon them ; and medical practitioners, unaccustomed to watch their effects, might be equally astonished.

Uses of the Tepid Bath.—In very excitable constitutions, or where the warm bath might prove too

stimulating, and as an introduction to the cooler baths, this bath may be of great service. Refrigerating in effect, and not exciting the sudden and powerful reaction of the cold bath, nor the particular effects of the warm bath, it is of notable value in a variety of cases thus indicated. And where the dormant powers of the constitution require awakening, and it is labouring under feeble attempts to relieve itself of some chronic disorders, as chronic rheumatism, atonic gout, the indigestion of debility, &c., the slow reaction induced by the tepid bath may be highly beneficial in gradually rousing the powers of the constitution ; but it is a remedy requiring medical superintendence.

We, of course, here allude, not to tepid sponging, but to complete immersion in the tepid bath.

THE COOL OR TEMPERATE BATH.

Whenever any kind of sudden shock is required to stimulate the nervous system by the use of cold baths, the advantages obtained depend entirely upon the glow or reaction produced. But as saline impregnation, as well as the impression of cold, is capable of stimulating the skin, it is plain that the combination of the shock of cold with saline stimulus may efficiently induce this glow in cases of debility, which neither the cold nor the temperate bath without that saline stimulus could accomplish.

It is on this account that sea-bathing (when at the warmest*) is found to be so valuable, from the combination of moderate shock with saline excitement. The same observation may be applied to baths of mineral

* The temperature of the sea on the English coasts very seldom ranges higher than 60°.

water impregnated with a variety of chemical agents, as the chlorides of sodium, calcium, and magnesium, assisted also by stimulating gases. And it is partly on account of the stimulating effects of such mineral waters upon the skin, and partly owing to the absorption of their chemical elements, that it is generally acknowledged, by those best able to judge of such matters, that bathing in appropriate mineral waters is quite as beneficial as drinking them.

Cool or temperate bathing is particularly adapted for the slighter cases of cutaneous debility; and by its regular employment the bather may be gradually accustomed to bear the full tonic effects of the cold bath; for which, in fact, it is an excellent preparatory substitute.

The time of immersion must vary with the strength of the bather. If shock is intended, then the more sudden the immersion, and the colder the fluid, the greater will be its effect; in general, reaction will be stronger up to a certain point, as the immersion is longer; but if once a fair reaction be felt, the bather should at once quit the bath, for a second chill being once established, a second glow, while bathing, seldom if ever takes place.

Here, as in the use of all remedial measures, the point at which utility ends and mischief begins is as various as the circumstances under which the constitution of the bather is placed. The most powerful *remedies*, by a law of Nature, are also the most fatal if misapplied; the same principle is applicable to temperate bathing, which may prove powerfully medicinal, used as a momentary shock, but very injurious to an invalid if he be too long immersed.

THE COLD BATH.

Whether we throw our retrospect into the early ages, when cold ablution was part of a religious rite, prescribed at Divine command by Moses, who was both priest and physician ; or trace it to the days of Roman superstition, when it boasted of innumerable holy wells in this and other countries, each claiming the supernatural aid of its tutelary saint, we shall reflect that, in all ages and in every country, *cold ablution* has continued to be universally acknowledged as the most necessary and the most salubrious of national customs in health, and one of the most powerful tonics in disease ; and it is therefore one which requires to be cautiously used. Inducing two different modes of action, it becomes either powerfully invigorating or overpowering and depressing, according to the strength of the bather and the manner in which it is used. Cold bathing, properly followed up, has a profound influence, not only upon the nervous system, but upon the *nutrition* of the whole frame ; and especially upon the growth and symmetrical development of the young. It is also, to a great extent, a preventive of debility of the skin, and one of the best resources against those diseases either directly or indirectly contracted from torpor or inactivity of the functions of the skin.

These powers render it a most efficacious remedy for several disorders, depending either upon feeble nervous power ; upon defective nutrition ; or upon chronic debility of the skin.

To enumerate all the diseases to which cold bathing is applicable, would require a numerous list of de-

rangements of the general health, connected either with disorder of the nerves, defective nutrition, relaxed fibre, or extreme delicacy of the skin.

GENERAL DIRECTIONS FOR COLD BATHING.

The remarks already made under the title of the warm bath apply also here, with greater force. If the bather has attentively perused what has already been advanced, he will have seen that *the great object of cold bathing is to obtain the greatest possible reaction in the least possible time.*

Common sense will therefore as much deter him from entering the cold bath slowly as from doing so rashly. He ought to arrange the circumstances under which he bathes so as to effect the best possible state for bearing the shock and ensuring the glow. An abiding sense of chill after the bath is always injurious; when this follows the bath, the time of immersion has either been too long or the water has been used too deep or too cold.

CAUTIONS.—The cold bath is inadmissible in all organic diseases, great obstructions, inflammations, fulness of blood, most eruptions on the skin, and it is particularly so in congestion of the liver, in a feeble state of the heart, determination of blood to the head, and great debility.

VAPOUR BATHING.

This term includes a variety of baths; but it is here applied to such only as depend upon the action of the vapour of water; an action very different from that of water baths.

The medicinal peculiarities of the vapour of water

especially depend, when it is applied to the human body, upon several conditions not generally attended to. It may be exhibited so as to produce a variety of effects ; either to cool powerfully, to soothe and relax intimately, to stimulate the surface generally, and equalise the circulation, or energetically to promote perspiration.

I. Powerfully cooling. The detrimental effect of wet clothing, when the body is heated by exercise and exposed to a draught of dry air, does not simply depend upon the contact of wet. It is the rapid evaporation, or drying of clothes on the body, which produces a much greater impression of cold than is due merely to the actual temperature of the draught of air to which the wearer may be exposed.

On a hot summer's day we have witnessed ice produced by the rapid evaporation of water under an air-pump. *Ether*, when dropped on the bulb of a thermometer covered with linen, by rapidly evaporating, causes intense cold in the mercury in the tube. A damp bed, in the same way, induces upon the sleeping guest a powerful impression of cold ; for animal heat is rapidly abstracted by converting the damp of the bed into the vapour of water. These facts are examples of a general principle.

II. It may be also applied so as to become intimately soothing and relaxing. In this case the vapour must be prevented from evaporating by some kind of waterproof covering. The powerfully anodyne effects of every kind of warm fomentation, warm poultices, and "water dressing," are owing to the same agent—warm vapour more or less confined to the surface. "The water dressing" alluded to is truly a local vapour bath,

and consists of lint or linen moistened with cold water laid upon the surface, and then covered with oil silk, and has, among the profession, superseded a multitude of antiquated dressings, ointments, and salves. Allaying pain, promoting the local circulation, economising warmth, and in general, without creating great heat, it facilitates all the vital processes of healing, and protects tender parts from the irritation of dry air.

III. The vapour of water may be employed so as generally to stimulate the surface and equalise the circulation.

A complete vapour bath, applied to the whole person, is of course here required. Vapour, like water baths, might evidently be divided into several classes, according to the temperature employed.

But while the various kinds of the latter differ only in temperature, vapour baths present, besides the question of heat, two other distinct properties for consideration. The first is, the great difference of the powers of *conducting* heat in the case of water and vapour; and the second, the peculiar effects of various degrees of dryness or moisture of the air impregnated with vapour.

(1.) Thus, although a water bath at 120° cannot be endured, steam vapour has been borne at 180° . A frog lives only two minutes in warm water at 104° , but will survive many hours in vapour at the same heat. If the air be only slightly damp, its conducting power is much diminished; ovens have been entered and occupied for many minutes at 250° , by several experimentalists, without injury, while flesh was being completely baked. In these cases the different conducting powers of hot moist air, and

of dry air, may be compared to the different effects upon the hand which touches them, of iron and of wooden rails heated by the summer's sun, when both are really of the same temperature.

(2.) A vapour bath has very distinct effects upon the skin according to the amount of vapour suspended.

This is a most important principle, already illustrated in the chapter on *change of air*.

The same heat operates very differently when the bath is loaded with steam, and when nearly free from it: the latter approaches the dry air bath. Suppose, for the sake of comparison, the heat be 106° .

If there be much vapour it conducts heat better; the same temperature, 106° , will be much *hotter* to the sense of touch; it will be more stimulating as regards mere heat (just as the iron rail feels hotter in summer than the wooden one); hence, instead of its producing the soothing effects of the vapour of water already described, the very reverse happens. It is on this and other accounts that vapour baths, as commonly constructed, often prove heating, and disappoint the physician. Incipient inflammations, or colds, are thus liable to be aggravated, because the moisture of the air, which in the vapour bath is always present, is not under control.

Nor is this all; the most important medicinal object of the vapour bath is either to restore the natural perspiration when obstructed, or to increase its flow. In thousands of cases the skin is dry, obstinate, and impervious; to restore a proper action to the skin is often no less difficult than indispensable.

The success of the vapour bath in producing true perspiration will in many cases be defeated if it be

too abundantly supplied with steam; because, as Liebig has shown, the evaporation of the fluids of the body through the skin is almost prevented in a very moist atmosphere, and that it is increased as the air is drier, warmer, and barometrically lighter. Hence it is that perspiration may fail to be induced in a very moist vapour bath, and yet be elicited in one less loaded with vapour, where not only is evaporation quicker, but the apparent heat, as shown by the thermometer, may be higher, with less distress; indeed, Dr. Gower informs us that, under the use of a *hot air* bath exhibited to a patient in bed, he has obtained a more abundant flow of perspiration at moderate temperatures than at a much greater heat. *To administer, therefore, the vapour bath upon philosophical principles, would require the moisture as well as the temperature to be measured by a proper instrument.**

USE.—The vapour bath may be adapted to effect several purposes. In addition to the influence of mere warm bathing, we here possess a powerful means of directly eliciting perspiration, in cases where the warm bath might prove insufficient for that object. According to the temperature, moisture, and time employed, vapour bathing softens, expands, or quickens the pulse; it equalises the circulation, impels it to the surface, and promotes either the insensible evaporation of the skin or excites a copious flow of its secretions. It then becomes a direct evacuant or depurator of the blood.

Rheumatism, scrofula, gout, bilious complaints in which the liver has secreted too little bile, disorders of the kidneys affecting the general health, also the

* The hygrometric thermometer.

indigestion of systemic oppression, and general *malaise* from torpid secretions sometimes, therefore, admit of remarkable relief through the constitutional changes effected in the blood by the vapour bath.

Incipient colds and inflammations, some affections of the lungs, especially where appropriate medication is employed, and a variety of skin diseases, may also be greatly benefited by its use. Its success, however, will depend entirely on a just appreciation of the particular derangements requiring relief. It is not the multiplication of remedies or measures, but their precise choice and adaptation which must restore the general health.

The subtle effects of vapours, whether applied to the skin or to the lungs, or both, are clearly shown in the following facts.

The ancient oracles at Delphi were uttered by a woman raving under the potent effects of a peculiar vapour. Chloroform and ether exhibit marvellous results due to vapour introduced into the air-cells of the lungs; the skin, indeed, is less influenced by vapours; yet fume baths of sulphur, iodine, and cinabar, applied to the skin, are known to be powerfully medicinal. Experiments made upon animals whose bodies alone were enclosed in gas-tight bags, show that various vapours and gases at length produce, in this way, violent effects. The vapour of newly-painted houses is acknowledged to have a deleterious influence, as well as the contact of paint.

A merchant vessel, on the homeward voyage, exhibited a scene of singular distress; every one on board became salivated; quicksilver had, by the bursting of a barrel, got loose in the ship's hold. It

was vapour of mercury which occasioned this mysterious mischief. A botanist, during an excursion, deposited in his hat a poisonous plant; the vapour of this plant caused him to be seized with an alarming illness. Again, a man who, unconscious of danger, laid down to sleep on some bales of tobacco, narrowly escaped death by its poisonous effects upon him.

It sometimes happens that medicine administered to the stomach fails to have a beneficial influence, either from its disagreeing with that organ, from a stomachic change effected upon the medicine, or from the circuitous nature of its course through the glands before it enters the blood. In such cases, great advantages may be derived by the use of medicine suspended in the form of vapour in the bath.

We witness the happy effects of absorption through the lungs and skin, in the beneficial influence of change of air impregnated with fresh particles; as a change from barren tracts to wooded country, especially pine forests, a change to the neighbourhood of sulphur springs, or a change to sea-air, from lowland vapours or miasmata. It is on the same principle that ague disappears as draining improves the soil. The Turks have for ages employed sulphureous vapours for bathing purposes, diffused through a spacious edifice. They breathe these vapours for hours. At many foreign sulphur springs such vapours are regarded as highly medicinal to the lungs. The company assemble to inhale the emanating gas, in a room especially devoted to that purpose. Sulphur water here falls in a violent stream upon a metallic boss, and thus, on all sides, spreads its odours. The neighbourhood of Aix-la-Chapelle is celebrated for its freedom from

consumption ; indeed, so powerful is the influence of the sulphur-gas of mineral springs, that residing near them has a remarkable influence upon the general health. This is effected by the absorbing powers of the skin and lungs. And it must be allowed that permanent influences, although slight, may in time produce profound physiological changes.

DOUCHE AND SHOWER BATHS.

These baths, of course, may be varied very much, according to the force, fall, quantity, and warmth of the water, as well as the number of minutes during which they are taken. The head ought *always* to be protected, and never, under any circumstances, submitted to any blow from the impulse of a stream of water. In cases where the extremities are generally cold, standing in warm water, or on flannel dipped in hot water, may be recommended. Employed cold, shower baths resemble cold baths in their action ; but if the shower descends *slowly*, they have an unpleasantly chilling effect ; on this account a full stream, taken for a few seconds only, with tepid water, is sometimes very advisable by way of preparation.

CHAPTER V.

COUNTER BATHING.

NOTWITHSTANDING the variety and unquestionable value of the baths already discussed, we sometimes hear it said, " I have tried warm bathing, but it proves

relaxing; shower baths occasion me a dreadful shock; vapour baths exhaust me, I can bear none of them. I have gone through *a course* without any good result." The same thing is too often declared of medicines, until some new combination of them, to the surprise of the recipient, at last proves successful. It is certain, however, that combinations of various modes of bathing, on the same principle, may prove highly salutary, when a course of single baths, on *the routine system*, has been attended with disadvantageous results.

The following description may be regarded as a type of this class of invalids:—Sleep is precarious, sudden noise alarming or intolerable, provocation quick. The temper becomes capricious, gloomy, and animated, by sudden turns. Chills are very readily taken, and a cold wind (as the phrase goes) cuts them to the bone, whilst slippers and hose of the warmest material prove inadequate to their comfort. Hot bottles during repose cannot, without distress, be dispensed with; indeed, the head sometimes burns at the expense of the feet, which are pinched with cold. Nervine medicines give very temporary relief; neither the stomach nor liver, &c., can long be kept in tolerable order; and, worse than all, fresh air at last fails to revive the spirits. In short, the powers of the nervous system, of generating heat, and of adequate circulation, are greatly below the healthy standard. The general health is greatly on the decline.

In these cases, so far as benefit may be obtained by the instrumentality of the skin alone, it is not sufficient merely to bathe—according to a simple course of warm baths, shower baths, or perspiratory baths,

on the contrary—the bathing must be so adapted to the irritability, nervousness, or low powers of reaction in the bather, and be so combined and conducted, that it shall constantly tend—

To economise and husband the vital powers.

To promote capillary circulation, without relaxing the fibres or enfeebling their contractility.

To give an increased tonic power to the mildest forms of tonic baths, avoiding over-stimulation, which always, in the end, produces depression.

To confer upon the debilitated skin, nervous centres, and perspiratory functions increased powers of resisting atmospheric changes.

These important objects ought never to be lost sight of in managing those cases in which the general health is much depressed. They are the exposition of a general principle ; it is the prerogative of science to extract from a multitude of facts such a generalisation as shall express, instead of the letter, the spirit of them all.

The records of Rome, of the customs, from time immemorial, of the northern tribes of America, Norway, Finland, and Siberia, as well as those of the luxurious inhabitants of the south, supply the facts ; the generalisation of which may be expressed by the principle of *counter bathing*,—the *bath*, and the *counter bath*. In Finland, Norway, Siberia, and North America, the hot vapour bath is followed up by one of snow or river water. While the Russian, half parboiled, rushes forth in barbaric wildness to roll and gambol in the snow, irrespective of sex, the Indian springs from his rude vapour pit to bound into a river. *The severity of the climate regulates the proper severity of*

the transition. The Fin, in this way, rejoices with impunity to burst from vapour at 160°, into his native air at 40° below freezing, and thus invigorates himself against the rigour of his climate. *In England, comparatively slight transitions are therefore requisite and sufficient for counter bathing.*

Messrs. Lewis and Clark, in their 'Expedition to the Sources of the Missouri,' give an interesting account of the bathing customs of the Indians, which illustrate the same principle.

"One of their men had so great a weakness in his loins that he could not walk, nor even sit upright, without extreme pain. They exhausted the resources of their art upon him in vain, and at length, at the suggestion of an Indian hunter, and by request of the patient himself, they placed him in a vapour bath, with the steam as hot as it could be borne. In twenty minutes he was taken out, plunged twice, in rapid succession, into cold water, and returned to the bath. During all the time he drank copiously of horsemint tea. At the end of three quarters of an hour he was again withdrawn, carefully wrapped, and suffered to cool gradually. The morning after the operation he was able to walk, and was nearly free from pain."

Major Long relates that the Indian *sweating* baths are in high repute for curing many disorders, and that they are generally constructed near the edge of a water-course, and formed of pliant branches of trees stuck into the ground in a circle, bent over at the top, and covered in every part with bison ropes; some of them contain only one person, others four or five. The invalid enters with a kettle of water

and some heated stones on which the water is sprinkled, until the requisite degree of steam is produced. When it is thought that the perspiration is sufficiently profuse, the patient is taken out and plunged into the water, previously breaking the ice if the stream is frozen. He is not subjected a second time to the action of the stream, but covers himself with his robe and returns home.

Here also we may again observe, that the severity of the transition is regulated by the severity of the atmospheric changes.

Counter bathing, in its simplest forms, is, according to its mode of application, a mild or a most energetic process for soothing or rousing the nervous and circulating functions. Rapid sponging with hot water, followed up immediately by cold or tepid ablution, has produced, in delicate persons, very remarkable results. It may be varied, to a very great extent, by the following combinations.—1. Vapour and shower bath.—2. Hot bath and cold.—3. Warm bath and cold douche or shower.—4. Vapour bath and tepid bath, &c., &c., which, under proper management, confer benefit when simple baths would prove worse than useless.

The value of transition baths is universally known in Eastern climes. What has for ages been the custom in the "City of the Sultan," where, during some parts of the year, its inhabitants, on account of their proximity to the Black Sea and the Russian wastes, are subjected to terrible atmospheric vicissitudes? They nationally adopt the custom of *counter bathing*. Reclining at first amid clouds of vapour, they are finally laved with cooling water.

"Here beauty on her broider'd cushion lies,
With languid brow, and dreaming down-cast eyes ;
A rose o'ercharged with rain : beside the fair
A kneeling slave binds up the glossy hair ;
Pours perfumed water o'er the drooping face,
And lends to loveliness another grace."

The Turkish baths form the climax of Eastern luxury, adorned with every ornament calculated, in unison with the delicious enjoyment of the bather, to heighten magnificence and enchant the eye.

Now every bath, however small, is contrived upon the same principle, comprising an outer room or hall, in which the bather's dress is arrayed ; a cooling-room pleasantly warmed and well furnished, and the bath itself, where the air is impregnated with hot sulphureous steam vapour. This is usually a vast hall, entirely formed of marble. They are so much frequented that large fortunes are acquired by them, in spite of the heavy government tax levied upon these establishments. It is worthy of note that the bathing-hall is supplied with fountains of both hot and cold water.

The bather, arrayed but in one thin garment, enters first the cooling-room, moderately heated by rills of hot water and by vapour issuing from the bathing-hall ; and provided there with wooden shoes, he soon passes into the hall. Streams of water poured over his dress render it thoroughly saturated ; while the evaporation from his dress (clinging closely to the person) tends greatly to cool the bather in a room where the floor is universally too hot to be touched with the naked feet. Hence hours can be spent in these baths. The limbs are gently rubbed with a glove of camel's hair ; the hair is combed and satu-

rated with water poured over the head. At the door of the cooling-room the dripping garment is exchanged. Reclining on mats and cushions, they sometimes repose for hours, wrapt closely in long white raiment.

But in the outer hall, folded in warm cloths, perfumed, and laid to rest on ottomans and sofas, they freely partake of luxurious refreshments. The morning levee begins. Such is the Turkish Hammän. The baths are used on alternate days by the men and the women respectively.

THE HARROGATE SPAS.

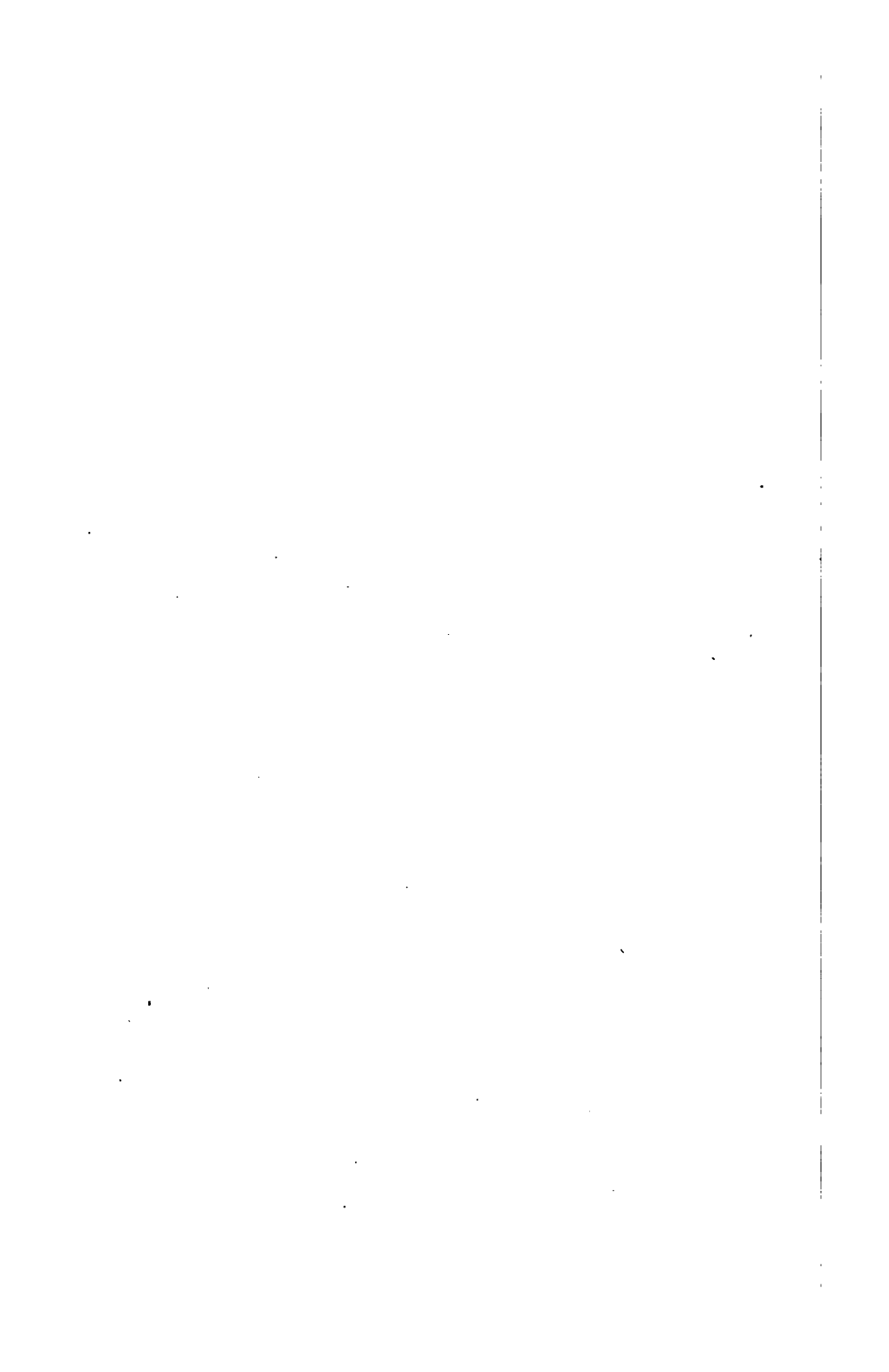
PART III.

AN INQUIRY INTO

THE MEDICINAL CHARACTERS

OF

THE HARROGATE WATERS.



PART III.

THE MEDICINAL CHARACTERS OF THE HARROGATE WATERS.

CHAPTER I.

PRINCIPLES OF INVESTIGATION.

At the very threshold of this inquiry we are met with a difficulty very cogently urged against the intrinsic efficacy of Natural Spas, viz. : That it is one of the most difficult problems in medicine to ascertain the exact value of what are called medicinal springs : That the salutary influences of a watering-place—with all its change of occupation and atmosphere, its relaxation and regimen—involve in uncertainty the precise influence which the mineral spring really exercises in the cure of disease.

This is considered a main difficulty necessary to be overcome before we can clearly ascertain the precise curative properties of the springs. How far we have succeeded in removing a stumbling-block which yet exists in the path leading to a proper appreciation of the value of such mineral waters, must be left to the judgment of the reader. We shall attempt to give him a sketch of the process of inductive evidence which has, during some years of reflection, carried to our own mind a full conviction of the independent efficacy of our springs, apart from all the *extrinsic* influences of regimen and change of air. We have

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association, into chlorides, carbonates, sul-

es, &c., &c. On the other hand, the physician,

versely conversant with the medical properties of the

various ingredients, and the virtues of similarly im-

pregnated springs, would, from a careful consideration

of these properties, be able, without a trial of the

waters, to pronounce a highly probable verdict upon

their actual medicinal qualities: *probable*, because he

would know that the properties of a compound medi-

cine are not always exactly represented by the sum

of the properties of each ingredient.

But such *probability* is not enough. The actual

virtues ought to be proved in face of this otherwise

damaging objection. It is evident this process would

be inadequate to detect and demonstrate the nature

and laws of *combined* medicinal operations. Another

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at *suggested* the stupendous laws which conserve the heavens. A falling apple, indeed, suggested the mighty secret of universal gravitation. From the laws suggested by experiments arose the principles of dynamical science.

But how were they *proved*? Terrestrial experiments could only suggest, not demonstrate them. It was not enough to *explain*, on hypothesis, the hitherto mysterious and contradictory movements of the planetary worlds. It was necessary to predict, and it was necessary to verify those laws by the accuracy of the predictions in their fulfilment. Such agencies, so subtle and recondite, fearfully and wonderfully working between distant worlds, could only be reached by subtle processes of research.

Not less profound and wonderful are the laws of medicinal vital reaction. The same process of investigation is, and ought to be applied for their detection. Experiment must suggest them. Prediction should verify them. The vital laws regulating the living particles circulating about the great centres of life, in

already endeavoured to briefly examine the effects of the latter, we must now notice those of the former.

The reader who is desirous of entering upon this question, should follow the line of inquiry which a fortunate discoverer of such springs would naturally pursue. Imagine that a score or so of such multiform spas had only just sprung to light. Delighted with the startling novelty, the enterprising possessor would anxiously await the verdicts of the chemist and the physician upon their chemical and medicinal virtues. The chemist would depone that the waters were thus and thus impregnated, and would accurately sum up their constituent elements, and then, according to the laws of the chemical affinity and solubility of certain known combinations, he would rearrange them and combine them, in the most probable state of their natural association, into chlorides, carbonates, sulphates, &c., &c. On the other hand, the physician, acutely conversant with the medical properties of the various ingredients, and the virtues of similarly impregnated springs, would, from a careful consideration of these properties, be able, without a trial of the waters, to pronounce a highly probable verdict upon their actual medicinal qualities: *probable*, because he would know that the properties of a compound medicine are not always exactly represented by the sum of the properties of each ingredient.

But such *probability* is not enough. The actual virtues ought to be proved in face of this otherwise damaging objection. It is evident this process would be inadequate to detect and demonstrate the nature and laws of *combined* medicinal operations. Another must be applied. And philosophical research is equally

applicable to every department of natural science. That method, the suggestive and inductive, is also applicable here, to search for and prove the laws of hidden operations ; a method which has so successfully been applied to astronomy, which has fathomed the depths of the solar system, estimated the speed of a sunbeam, and detected the laws of all the celestial movements. Let us glance at this admirable process.

Untiring observations on the starry spheres, during the lapse of ages, accumulated a multitude of facts. Then, ingenious experiments were instituted to explain the laws of motion, and these experiments at last *suggested* the stupendous laws which conserve the heavens. A falling apple, indeed, suggested the mighty secret of universal gravitation. From the laws suggested by experiments arose the principles of dynamical science.

But how were they *proved*? Terrestrial experiments could only suggest, not demonstrate them. It was not enough to *explain*, on hypothesis, the hitherto mysterious and contradictory movements of the planetary worlds. It was necessary to predict, and it was necessary to verify those laws by the accuracy of the predictions in their fulfilment. Such agencies, so subtle and recondite, fearfully and wonderfully working between distant worlds, could only be reached by subtle processes of research.

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man, the masterpiece of creation, are not less difficult of search than those laws which maintain the balance of a universe of revolving worlds. The telescope and the micrometer, indeed, aided by the mathematics of Newton, have surveyed the abyss of space, to tell us that, even there, the same great laws are at work binding the universe in one sublime bond of central revolutions. And the microscope, too, and the test-tube, aided by the science of Liebig, have been busy with the arcana of life, scrutinising some of its hidden mysteries. In each investigation, research had been useless without instruments sufficiently delicate to appreciate and observe them. By measuring the time of descent of a falling bullet, we may define that gravity is an accelerating force which generates a velocity of $32\frac{1}{2}$ feet per second. But in animal life there exists a force called *vital*, appreciable indeed, but not measurable. Hence, observations of its effects upon substances submitted within the body to its influence, are of the most complex and delicate nature. This force is neither gravitating, mechanical, electric, nor chemical, nor vegetative alone, but a combination of all, subservient to the principle of life. It is a simple thing to note the beats of a pendulum near the equator or the pole, in order to determine the variations in gravity, and thence the magnitude and figure of the earth. But to comprehend one beat of the pulse, and appreciate the vital actions both accompanying it and producing it, is a problem worthy of the highest human intellect. It is on such accounts that the methods of suggestion and verification are so important in physiological investigations regarding the action of medicinal agents.

Fortunately for the subject in hand, the substances submitted to the operation of the vital force by the exhibition of the solutions of the various ingredients natural to these springs, are most of them the familiar constituents of the blood of man. Allied by nature to his chemical constitution, they present within that fluid a scene of incessant vital transformations, affording wide scope for experimental research. Whilst the generality of both vegetable and metallic remedies baffle all inquiry as to the part they take in modifying the chemistry of life, the actions of such ingredients as form essential components of the blood, may fairly be considered as within the reach of successful observation.

The blood may be regarded, indeed, as liquid nutriment in its highest organized state, endowed with the principle of life. That which incessantly builds up the whole frame, disburses all its expenses, forming bone, muscle, and nerve, membrane, cuticle, and hair, as well as supplies every possible secretion out of its own wealth of combinations, must be an exquisite laboratory of vital processes in health and disease. It is constantly spending its resources in all the processes of repair demanded by the waste of action, and as constantly gaining supplies to satisfy that demand. Agents, therefore, which do contribute mineral substances essential to its constitution in health, can, in disease, by no means be insignificant reinforcements to the scene of that restless struggle for the mastery, waged, as it were, between the superior vital and the inferior chemical force, between the plastic or attractive powers of nutrition and the loosening or repulsive powers of atomic dissolution. Animal life,

indeed, in the simplest point of view, consists in manifold exchanges of particle for particle, atom for atom, between the elements of the blood and the substances of the organic tissues.

An indisputable analytical report of the composition of the principal classes of these waters, from the pen of Professor Hofmann, has been completed; a report as remarkable for the clearness and elegance of its diction as for the elaborate merit of its scientific details.

He has furnished us with a tableau of the manner in which Nature has grouped, in many of our springs, the following substances :

GASES DISSOLVED IN, OR RISING IN BUBBLES FROM, THE WATERS.

Oxygen.	Carbonic acid.
Nitrogen.	Carbonetted hydrogen.
Sulphuretted hydrogen.	

MINERAL CONSTITUENTS, ARRANGED EITHER ACCORDING TO SOLUBILITY OF THEIR COMPOUNDS IN PURE WATER, OR IN CARBONIC ACID WATER :

Chloride of potassium.	Carbonate of potash.
Chloride of magnesium.	Carbonate of magnesia.
Chloride of calcium.	Carbonate of lime.
Chloride of sodium.	Carbonate of iron, of soda
Iodide of sodium.	Bromide of sodium.
Sulphide of sodium (or	Silica.
Sulphur united to sodium).	Manganese.

Comparing, then, the chemical analyses of the springs obtained by Professor Hofmann, with the analysis of the blood, we find that the chlorides of potassium and sodium, oxide of iron, magnesia, soda, lime, sulphur, manganese, and silica, are ingredients native both to the springs and to the blood.

The starting-point of our inquiry is, the correlation

of these mineral ingredients with the blood itself, the most complex of all organic products. The investigations of Denis, Lecanu, Simon, Nasse, Lehmann, Bequerel, Rodier, and Gavarret, have combined to give the following analysis of healthy human blood. We have made the computation from their researches, for 200,000 grains, which nearly represent 25 pounds, the average amount in a healthy adult man, in order to secure facility of comparison with the analysis of the springs, and to avoid minute decimal parts :

MINERAL CONSTITUENTS.

	Grains.
Chloride of sodium	720
Chloride of potassium	72
Phosphate of lime and magnesia	50
Tribasic phosphate of soda	40
Carbonate of soda	168
Sulphate of soda	56
Oxide and phosphate of iron	100
Mineral constituents	1206

ORGANIC CONSTITUENTS.

Red particles of the blood	26,200
Albumen	14,000
Fibrine	440
Fatty matters	260
Extractive and organic matters containing <i>sulphur</i> largely, also salivary matters, biliary colouring matters, silica, and manganese	1094
Water	156,800
Organic constituents	198,794
Mineral constituents	1206
Grains in the adult human blood	200,000

In order, therefore, to apply the method of research already described, it is necessary that experiments should have been registered as to the *separate* medi-

cinal operations of these substances. Then, the consideration of the natural groups of these agents, in the various springs, will suggest the general principles and laws of their operation.

We shall next have to seek for their *verification* by the agreement of predictions calculated upon them, with the observed results; the highest proof of their truth.

The substances noted on page 136 may, according to the latest researches, be classed as follows :

I.—BLOOD REMEDIES.

- (a.) *Hæmatic*.—Remedies contributing elements to the constitution of the blood. Medicating to the blood.
- (b.) *Depurating*.—Remedies relieving the blood of waste products destined to be eliminated through the secreting organs, by promoting general or special secretions.
- (c.) *Alterative*.—Remedies exerting a gradual but profound influence in effecting constitutional alterations.
- (d.) *Spanæmic*.—Remedies reducing plethora, diluting, solvent, liquefying, promoting capillary circulation, and lessening the adhesiveness of the blood globules to the sides of the minute vessels, the prelude to congestion.

II.—EVACUANTS.

Promoting particular discharges from the system, either sensibly or insensibly, as by sensible or insensible perspiration, purgation, &c., &c.

III.—NERVINE.—Changing nervous action.

- (a.) *Tonic*.—Generating increased nervous energy.
Increasing molecular *tension* (generally or locally) of the muscles, both voluntary and involuntary; heightening contractility of minute vessels, abating chronic congestion, and facilitating capillary motion.
- (b.) *Stimulant*.—Arousing actual, though dormant, nervous energy.
- (c.) *Narcotic*.—Sedative, soothing, &c., &c.

IV.—SPECIAL.

Remedies acting specially—As antidotes to chronic, metallic, or syphilitic poisoning.—Anthelmintic, destroying worms. Suitable as special local applications, &c.

GROUP I.

THE CHALYBEATE WATERS.

The pure chalybeates, holding in solution a less amount of mineral elements than ordinary spring water, with the exception of iron, derive their chief action from THE CARBONATE OF IRON dissolved in the water by the aid of carbonic acid gas. Here the action of the minute doses of the chloridal salts is completely transcended by that of the chalybeate element which, being presented in a very dilute, readily-assimilated state, is well adapted for elaboration within the blood, as oxide and phosphate of iron.

Now, from remote ages *iron* has, to this day, been celebrated as a restorative tonic.

But not until the era of new methods and instruments of research could the accumulated facts of many centuries *suggest* a new law of operation susceptible of verification.

The extraordinary changes, effected during the use of steel among the particles of impoverished blood, suggest the principle of BLOOD MEDICATION. The eye, rendered a thousand times more penetrating by the microscope, and the balance of the chemist, sensitive to the thousandth of a grain, place this great principle beyond all doubt.

Such renovation of the blood would warrant the

prediction, that *steel*, judiciously exhibited, in the most soluble and easily-assimilated form, such as chalybeate waters present, ought to exceed, in medicinal operation, the use of ordinary steel drugs. Accordingly, Professor Conolly, of the London University, writes, "That they (chalybeate waters) more manifestly alter the state and appearance of the body *than any other medicine whatever*, in conditions of the body suited to their use; no alteratives, in fact, are so effectual. They substitute general energy for general debility, and revive the colour and health in patients, before pallid and wan, or discoloured, as in the chlorotic, from long disease."

And again, the celebrated Edinboro' Professor declares, "*Mineral Waters often produce cures which we in vain attempt to perform by the combinations in our shops*, even though they contain nothing but iron." [The *italics* are their own.]

To such testimonies, were they insufficient for verification, might be added many authentic records.* The prediction is here verified in the most satisfactory manner. The chalybeate element, therefore, *medicates the impoverished blood*. And we may fairly claim, for chalybeate wells, a restorative power exceeding ordinary steel drugs.

An objection, supposed to have weight, has been advanced against this conclusion: That the actual amount of iron exhibited, during the use of the chalybeate springs, is *inadequate* to produce these surprising effects. An objection which, against such evidence, can have no more force than the assertion, that

* See 'Records of Cures effected by the Harrogate Waters in the Reign of Charles I.'

the power of gravitation does not seem adequate to bind the earth in its solar orbit. But the statement itself is erroneous. The iron is not inadequate, for 10 grains of sulphate of iron, the strongest steel drug in use, contains only one grain of oxide of iron. Therefore, a grain of the oxide suspended in carbonic acid waters, is a chalybeate equivalent for ten grains of that excellent preparation of iron, the sulphate. Steel wells are then, by no means inadequate remedies, so insignificantly weak in chalybeate impregnation.

The simplest group of medicinal elements next presented for consideration is the Starbeck water, which contains a combination of *the chloride of sodium* and the alkaline carbonates, with only a comparatively slight sulphurous impregnation.

GROUP II.

STARBECK, OR KNARESBORO' SPA.

PRINCIPAL INGREDIENTS.

Chloride of sodium . . .	122	Carbonate of lime . . .	7
Carbonate of potassa . . .	12	Carbonate of magnesia . . .	5
Carbonate of soda . . .	5	Sulphide of sodium . . .	2

(In round numbers of grains per gallon.)

PROFESSOR HOFMANN'S ANALYSIS.

The first of these, in the small quantity here present, is slightly alterative, evacuant, digestive, tonic, and stimulant. The sulphide of sodium, the source of the sulphureous principle, is also comparatively small; the strong sulphur water being nearly nine times richer in this respect. The alkaline character of this group of remedies is the chief charac-

teristic. Two drachms of *salt* (the chloride of sodium) in the gallon, impart some savour to the spring, but as it largely enters into the composition of all the waters, except the pure chalybeates, we shall here glance at its general properties, as it is by no means an insignificant item in the chemistry of life.

Its uses must be great, to have become a universal condiment among all nations.—To tempt the wildest animals to risk their lives in the presence of man, in order to obtain it. To excite, as it does, after long deprivation, according to Park, “the most painful longing, which no words can describe.” To see “an African child suck a piece of it as the greatest luxury, as eagerly as if it were sugar,” and the wildest animals rendered tame, so as to follow him who has once treated them with it. To hear the American farmers state that its free use enables their cattle to survive the severest cold which would otherwise destroy them, and to learn that it “gives taste to the meat and consistency to the fat:”—These are things which suggest, on a cursory glance, how essential *salt* is to the operations of animal life. Salt is indispensable to the integrity of the health, the blood, and the secretions.

Salt is indeed intrinsically essential to healthy blood. There are diseases in which the blood has become robbed of salt; this alone keeps it fluid, and scarlet, and stimulating to the heart. Oxygen ceases to redden it unless salt is there too; and the black, coagulated blood of cholera, of malignant yellow fever, instantly returns to its bright colouring and fluidness, by restoring to it this salt. The tears and all the animal juices are, in health, salted by Nature’s hand—and digestion itself cannot be performed without the

chemical acid* yielded by salt. To say that salt may also be used as a domestic medicine in more ways than one, or as a relish, or as friendly to the skin in the bath, is to tell little of its hidden uses.

Salt is one of Nature's contrivances for conveying, harmlessly and pleasantly, a store of medicinal and necessary elements. It supplies *chlorine*; that gas which, with lime,† destroys the potency of infection, with quicksilver, forms calomel, and also corrosive sublimate, a deadly poison.‡ With one of the elements of water, hydrogen, it forms a most useful tonic and stimulant of the liver. It furnishes *sodium*, which, uncombined, would be a powerful caustic, but united with chlorine, is a compound ready prepared for the formation of bile under the control of the forces of life. *Salt* gives density to the blood, and endows it with an attractive force for lighter liquids, which could not otherwise be so well absorbed from the stomach.§

Sodium, in its pure state, is a metal in colour resembling silver, possessing the singular property of burning spontaneously, with a rapid combustion, when placed in contact with water, uniting with the oxygen of the latter, and so forming soda, and setting free its hydrogen.

The metals magnesium, potassium, and calcium, similarly become magnesia, potassa (potash), and lime, by uniting with oxygen.

* Hydrochloric acid. Common salt being a compound of chlorine and sodium; the acid, a combination of an element of water—hydrogen—with chlorine.

† Chloride of lime. ‡ Two atoms of chlorine and one atom of quicksilver; calomel being formed of one atom of chlorine and one of quicksilver, chemically combined. § Alcoholic liquids excepted.

Of the utility of the carbonates, the most commonly used remedies of the *Materia Medica*, there can be no doubt. They neutralize acidity, allay irritation, attenuate the circulating fluids, reduce the pulse, promote expectoration and secretion in general. They especially determine speedily the evacuant action of the kidneys, act beneficially in a gouty habit of the system; and, according to most eminent writers, possess hæmatic, depurating, alterative, and especially solvent and liquefacient properties. No remedies, indeed, have a greater effect in combining with, and preventing the formation of, *uric acid*, that dreaded and treacherous tormentor of the victims of gout, gravel, and stone,* and some supposed forms of lumbago. *Uric acid* is the element of red gravel, but it is not always the principal base of the painful malady here alluded to.

Applied as baths and washes, they have long been esteemed as local applications for a variety of skin disorders. Forming, with the sebaceous exudations of the skin, a natural cleansing soap, alkaline solutions exercise a very beneficial influence, in baths, upon the cutaneous functions.

Hufeland, the great German physician, who resided at Berlin, has made some capital comments on the alkaline water of *Schlungenbad*: (grains per gallon)

VICHY.	SCHLANGENBAD.
292 . . .	33 grains of carbonate of soda.
21 . . .	17 do. do. of lime.
4 . . .	12 (nearly) do. of magnesia.
42 . . .	21½ chloride of sodium.

* "Chalk stones"—so called, indeed, by those "unfortunates" who can with their knuckles "chalk" their score in the billiard room—are not formed of chalk at all, but of *urate of soda*.

He says that he knows no spa so adapted to retard or repress the articular stiffness and dryness incidental to even healthy or premature old age, from "fast living." "I know by experience," he continues, "that a regular annual use of the spa imparts to old age, cheerfulness and agility of the joints, and prolonged strength. If we consider its qualities, it is peculiarly fitted for a lady's bath,—for it beautifies the skin, and renders it more juvenile and elastic, whilst it gives mobility to the limbs." It will be seen above, that Schlangenbad (and it contains no carbonic acid gas or sulphur gas) much more nearly resembles the Starbeck water than does the *Vichy* water. It is worthy of remark that the Starbeck Spa is the most alkaline water in Great Britain.

I have directed this Spa to be taken as a general drinking-water for ordinary purposes, with marked benefit in the case of a lady who had been afflicted with chronic gout for sixteen years, and who had visited Pau and Barèges and resided at Bath with little benefit.

CHAPTER II.

THE MEDICINAL CHARACTERS OF THE CHLORIDES OF POTASSIUM, MAGNESIUM, AND CALCIUM.

THE CHLORIDE OF POTASSIUM,

Or Muriate of Potash, was formerly in use as a cooling febrifuge, and was considered resolvent and diaphor-

etic, and in these respects somewhat resembles the properties of the muriate of ammonia. When mixed with water it produces a greater degree of cold than common salt. Professor Pereira remarks, "If Dr. Garrod's hypothesis on the causes of scurvy be correct, it might be advantageously used as an *antiscorbutic*."

We select the following group as next in order of complexity for consideration.

GROUP III.

(I.) MONTPELIER MILD SULPHUR,

AND

(II.) MAGNESIA WATER.

(PRINCIPAL SALTS.)	(I.)	(II.)
Carbonate of lime	20	19
Carbonate of magnesia	3	10
Chloride of potassium	4	25
Chloride of sodium	232	220
Sulphide of sodium	3½	2*
Sulphide of lime	12	1

(Round numbers in grains per gallon.)

The minute doses of sulphate of lime, a particularly inert ingredient, may be neglected in the consideration of the action of the other elements. The most remarkable salt is THE CHLORIDE OF POTASSIUM, which, as it is *almost peculiar*, among British waters, to those of Harrogate, and as it is an essential component of healthy human blood, is deserving of strict investigation. And comparing the above with an equal amount of that fluid, viz., 70,000 grains, we have, from

* Calculated from the amount of sulphuretted hydrogen.

page 137 (comparing this water with the salts of the blood)—

MAGNESIA WATER.		ARTERIAL CURRENT IN MAN.	
Carbonate of lime . .	19	Phosphate of lime, and	} 17
Carbonate of magnesia .	10	Phosphate of magnesia .	
Chloride of potassium .	24	Chloride of potassium .	25
Chloride of sodium .	220	Chloride of sodium .	252

exhibiting a highly interesting and suggestive similarity between their respective components. May not, then, the chloride of potassium prove a truly hæmatic remedy, contributing to unhealthy blood, defective in this ingredient, a supply of one of its essential ingredients? And as we know by the microscope and by chemistry, that iron, in some cases, medicates the blood, can we claim the same principle of action, or blood medication, for the *chloride of potassium*? First, we shall attempt to show that, in giving liquor of potash in medium doses, it is transformed in the system into chloride of potassium by the hydrochloric acid existing in the gastric juice. It is true the lactic acid exists sometimes in the stomach, but it can have no effect on the potash in the presence of the stronger mineral acid.

The following calculations show the proportions in which chlorine and hydrogen are components of the hydrochloric acid of the gastric juice, and in which oxygen and potassium chemically unite with each other.

Let us take the sum of the equivalents forming potassa and hydrochloric acid, (in grains):

48 Potassa	.	.	.	{ Potassium	.	.	40
				{ Oxygen	.	.	8
							<hr/>
37 Hydrochloric acid	.			{ Chlorine	.	.	36
				{ Hydrogen	.	.	1
							<hr/>
85 Sum of the potash and hydrochloric acid	.	.	.				85

Again, if we add 76 grains of chloride of potassium to 9 grains of water :

Gra.						Gra.
76 Chloride of potassium	.			{ Chlorine	.	36
				{ Potassium	.	40
						<hr/>
9 Water	.	.	.	{ Hydrogen	.	1
				{ Oxygen	.	8
						<hr/>
85 Sum of the chloride of potassium and the water	.	.	.			85

A mixture, therefore of 37 grains of hydrochloric acid and 48 grains of potassa, by mutual decomposition, would form chloride of potassium 76, and water 9 grains. Potash has a strong chemical affinity for chlorine, hence, when potash or a solution of potash in water, called liquor potassæ, is brought within the action of the hydrochloric acid, a change of combination takes place in the following manner :

Let H represent hydrogen, Ch chlorine, O oxygen, HO water, Pm potassium, and PmO (potassium and oxygen) represent potassa. Then HCh will denote hydrochloric acid, and Ch Pm will denote chloride of potassium. Now by chemical affinity—

H, Ch and Pm O become Ch, Pm, and HO.

That is, hydrochloric acid and potash, when mixed, become chloride of potassium and water.

It follows that a medium dose of liquor potassæ, (15 drops), produces within the stomach, by the action of its hydrochloric acid, $1\frac{1}{3}$ grain of chloride of po-

tassium;* a fact suggesting that small doses of liquor potassæ act in the system as *chloride of potassium*. Now, potash-water has long been celebrated as a *hæmatic* remedy, especially in scurvy, gout, rheumatism, and gravel. As an *alterative*, in scrofula and syphilitic disorders, as a *spanæmic* in plethora or too great redundancy of rich blood, and as a *depurative*, in stimulating the secretions of the kidneys, skin, and mucous membrane. And as an *evacuant* promoting the evacuation of some detained morbid elements.

The same ultimate action is therefore reasonably suggested as highly probable for the chloride of potassium as for small doses of the liquor of potash.

It is well known that lime, lemon juice, and potatoes have the power of preventing and curing the scurvy, and there is strong reason for believing that this is owing to the potash which they largely contain. In proof of this, we may mention that all the inmates of the Crediton workhouse, who fell sick with the scurvy, had chiefly been fed upon rice, which is known to contain a very minute quantity of potash. Dr. Garrod found potash efficacious to cure them. These facts seem to show that a deficiency of potash in the blood is the primary cause of scurvy. It is singular that potash exists in the blood, only as a chloride of potassium.

Such experiments, then, suggest considerable hæmatic, alterative, spanæmic, depurative and evacuant properties, as belonging to the *chloride of potassium*.

It is also constantly eliminated from the system,

* Add liquor of potash to hydrochloric acid sufficiently to neutralize it. By mutual decomposition chloride of potassium and water will be formed. And if one drachm of the liquor be used, which contains 4 grains of potash, 5½ grains of the chloride will be obtained.

and as constantly imbibed in the food. Like the chloride of sodium, it appears to be a natural stimulant of the various secretions, and, according to LIEBIG, *without its abundant supply, the production of milk is impossible.*

Dissolved, therefore, in a mineral water, we should predict its medicinal influence in scurvy, gout, rheumatism, and some disorders of the kidneys. And from the allied properties and similar effects of weak carbonated alkalies, we might predict a combination of them with this salt would considerably assist in developing its operation. But these predictions are undoubtedly verified in the daily uses at the Hospital, of the Magnesia Water. No water in Harrogate is in more general repute, or more largely used. I could detail many cases benefited by it. We must now advert to —

THE CHLORIDE OF MAGNESIUM,

Which is formed by adding the hydrochloric acid, or gastric acid, to magnesia or its carbonate. Though not a combination native to the blood, yet it is a very safe, mild, sedative, and aperient salt, entirely free from all irritating properties: and I give this opinion, as it is not mentioned by Pereira, on the following grounds. Taken in large quantities, magnesia remains inert, except acidity be present. Many ounces of pure magnesia have been known to remain in the alimentary tube for a long time, in the form of intestinal concretions. For it proves purgative only when transformed by the gastric acid into chloride of magnesium.

The manner in which this transformation occurs may be thus expressed, Ch representing an atom of

chlorine, O one of oxygen, Mg magnesia, Mm magnesium, H hydrogen, H Ch the gastric acid. Ch Mm chloride of magnesium, and HO representing water,

Magnesia . . .	Mm. O.	$\left. \begin{array}{c} \text{RECOMBINE} \end{array} \right\}$	Ch. Mm. . .	Chloride of magne-
And gastric acid .	H. Ch.		H. O.	sium and water,

i. e., the gastric acid united with magnesia forms *water* together with chloride of magnesium. (This is the same process which occurred with chloride of potassium.)

Now, in the irritation arising from acidity of the stomach and intestinal canal, common to children, no remedy surpasses magnesia. But after neutralizing the acidity, it then acts, without irritation, as a safe, mild, but efficient aperient, not as magnesia, but as *chloride of magnesium*.

Again, we have little or no evidence for the effects of the chloride of potassium on the biliary secretion, but we know that combinations of this with the chloride of magnesium, have gained, at the continental springs, a reputation for unloading the liver and promoting the discharge of the bile. And this gives indirect evidence for suggesting that the aperient action of the chloride of magnesium, is of a local depurating character, acting directly upon the mucous membrane and indirectly upon the discharges from the liver.*

If, therefore, we complete a new group by introducing the sulphureous principle,† we must predict,

* As with the chloride of calcium, the action of the chloride of magnesium will be to produce within the blood (from its phosphate and carbonate of soda) phosphate of magnesia and carbonate of magnesia with chloride of sodium.

† The reader will find an account of its medicinal action under its proper head.

for such a spring as the *Montpelier mild sulphur water*, in addition to most of the qualities already enumerated for Group III, both an *alterative* and spasmic influence, as well as a peculiar action upon the liver and respiratory organs :

GROUP IV.

NEW CRESCENT WATER.

(*Hospital Strong Sulphur Spring.*)

(PRINCIPAL SALTS.)

Chloride of potassium . . .	11	Carbonate of lime . . .	25
Chloride of magnesium . . .	11	Carbonate of magnesia . . .	6
Chloride of sodium . . .	369	Sulphate of lime . . .	51
Carbonate of iron . . .	1	Sulphide of sodium . . .	7

(In round numbers.)

This combination is the most remarkable of all the Harrogate waters ; no other such strong sulphureo-chalybeate impregnation being known in Europe. The data already discussed now furnish us with the means of predicting for it medicinal properties of peculiar importance. Hitherto it has been used almost exclusively as a bathing-water ; a great oversight. It is to be hoped the Commissioners will provide a proper apparatus for rendering it fit for internal use, as in the case of the Magnesia water. The group, with the exception of the sulphide of sodium, bears a strong resemblance to the Kissengen water in Bavaria, which, like this spring, contains no chloride of calcium, so richly impregnating the groups next to be considered.

GROUPS V, VI.

(I.) IMPERIAL CHALYBEATE SALINE.*

(II.) MONTPELIER SALINE CHALYBEATE.

	(I.)	(II.)		(I.)	(II.)
Chloride of calcium .	52	159	Chloride of sodium .	169	667
Chloride of potassium .	27	11	Carbonate of magnesia — .	42	
Chloride of magnesium .	34	36	Carbonate of lime .	7	—
Carbonate of iron .	4½	—	Carbonate of iron .	—	2½

(PRINCIPAL INGREDIENTS.)

In addition to the salts already discussed, these natural groups of remedies introduce for consideration,

THE CHLORIDE OF CALCIUM,

A more powerful ingredient than any yet noticed. This salt is the principal agent found in the waters of Bath, so celebrated for their resolvent effect upon gout and gouty enlargements; we subjoin, in a note, the analysis by Mr. Noad, quoted by Dr. Tunstall, in his work on the Bath Waters †

CHLORIDE OF CALCIUM, considered as an ALTERATIVE, exerts a gradual but profound influence upon the state of the constitution.

Constitutional remedies undoubtedly act, after absorption, upon the blood. Examining the table at page 137, the reader will observe that the *chloride of calcium* is not, as such, an ingredient of the blood.

* Formerly called the Cheltenham Water.

† A gallon of the Bath Waters contains, according to this gentleman, and we omit the decimals—

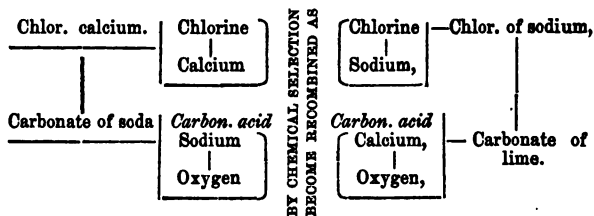
43 grains of chloride of calcium.	} Nearly.
12 grains of chloride of magnesium.	
1 grain of carbonate of iron.	

Besides which he mentions *carbonate of soda* in a small quantity, nearly a drachm of *sulphate of soda*, and a drachm and a half of *sulphate of lime*, and 5 grains nearly of *silica*.

Nor can it so exist in it. Formed by the chemical combination of *chlorine* with *calcium*, the metallic basis of *lime*, this chloride, like that of magnesium, is very prone to be decomposed by the alkalies of the blood, which, in health, according to BARON LIEBIG, is always alkaline. The chloride of calcium, as dissolved in our waters, is decomposed by adding to them a solution of the carbonate of soda. A double change takes place. By mutual decomposition—



The manner in which this transformation takes place within the blood, will, it is hoped, be intelligible to the general reader, by the following diagram. Remembering that lime is formed by the chemical union of calcium with oxygen—that carbonates of lime and soda consist of carbonic acid united with lime and soda, and chloride of sodium, of chlorine combined with sodium, then—



Here we have a beautiful illustration of the part which oxygen, the chief element of our breath, so actively takes in the chemistry of life. Oxygen seizes upon the calcium forming lime, whilst chlorine unites with the sodium, and carbonic acid converts the lime into a carbonate of lime.

The action of the chloride of calcium within the blood is first to transform the *carbonate of soda* into chloride of sodium and carbonate of lime; and next, the blood, when saturated with the chloride, will begin to act upon the tissues containing any salt of soda which is under the influence of the chemical affinities of the remedy. Now the worst stage of *gout* is characterised by an accumulation of *uric acid* within the system, which, uniting at last with the free soda of the blood, forms *urate of soda*; the chief ingredient of gouty chalk stones. The suggestion, then, forcibly arises, that the action of the chloride of calcium is to decompose the urate of soda; in other words, to *resolve* or disintegrate the enlargements chiefly caused by its presence: a suggestion amply verified by experience. Theory and practice cannot agree more closely.

The *chloride of calcium*, then, promotes the action of oxygen within the system, changes the condition of the blood, and most probably breaks up, in favorable cases, the elementary basis of gout.

It might similarly be shown that the same remedy after exhausting the carbonate of soda of the blood, next will act upon its phosphate (see page 137); *producing chloride of sodium and phosphate of lime*. On the whole, therefore, it tends—to change the blood, when the salts of soda exist in it, and to charge the system with *carbonate of lime* and *phosphate of lime*. But these are the earthy elements of BONE. Now one of the worst forms of scrofula is called RICKETS.*

* *A principal and often the first and only sign of this disease in children is the enlargement of the wrists.* But nearly all parts of the bony skeleton are liable to become *curved*, especially the spine, ribs, long bones, and breast bone. Crippled feet and general deformity and dwarf-

Indeed, it has been termed *scrofula* of the bones. "The distinctive character of rickets is, softness of the bones in consequence of a deficiency of earthy matter in them."—UNDERWOOD.

	HEALTHY BONE (DRY TIBIA).	RICKETY BONE.
Earthy salts	53·6	26
Animal matter	46·4	74
In parts	100	100

Analysis of healthy human bone :

Phosphate of lime	37·7
Carbonate of lime	10·0
Phosphate of magnesia	1·3
Cartilage	51·0
	100·0

Hence it is evident that the action of the chlorides of calcium and magnesium within the blood, by decomposing its salts of soda, is to supply the blood with the elements of bone. These considerations suggest the value of the waters in *rickets*.

Spinal distortions, in almost every instance, commence in youth, at the time when the bones become more solidified by the increased deposition of the salts of lime and magnesia. When, therefore, any unequal strain is maintained among the complicated muscles of the spinal tract, by the constrained positions of school discipline, by writing in a peculiar position, or even reposing continually on the same side, the yielding bones of the flexible spine, when softened from a deficiency of *earthy nourishment* within the blood, gradually assume an unnatural twist, and, in general, a double twist. At the same time, the breast, a waddling, hobbling gait, yet accompanied by remarkable vivacity of disposition and general acuteness of mind, form a grotesque combination in many persons originally afflicted with RICKETS.

becomes *pigeon-chested*. Another evil, in females, is the distortion of the bones of the pelvis, which renders parturition difficult and sometimes impossible, without the sacrifice of the offspring for the preservation of the parent. GLISSON remarks, that he seldom examined the bodies of infants dying of rickets without meeting with tubercles in the lungs: a strong presumption that rickets, and therefore scrofula, have a common origin with consumption.

But other forms of scrofula are enlarged glands and joints, white swelling and some peculiar skin diseases. Now, since the chloride of calcium exhibited in mineral waters, by the changes which it produces in the blood, is suggested for one of the forms of scrofula, *Rickets*,—have we grounds for ascribing to it anti-scrofulous properties in general?

If then it appears that extensive trials of the chloride in scrofulous diseases have met with good success, and that all those waters fully enriched with it have acquired a similar character, these facts would both suggest and prove the general action of the remedy, as dissolved in the Harrogate waters, independently of the other ingredients.

Now, Biett, the distinguished physician of the Hospital of St. Louis, Paris, tried it very extensively, and considered it equal to the chloride of barium, for the removal of scrofulous enlargements.

Beddoes tried it in 100 cases, with great success; very few cases receiving no benefit. Besides these observers, we might quote the favorable experience of—

Hufeland,	Niemann,	Pereira,	Wood,
Vogt,	Heinekin,	Paris,	Fourcroy.
Hermann,	Lisfranc,	A. T. Thompson,	

But besides such testimonies we observe that the springs most celebrated for similar properties are those of—

Saltzhausen (Hessen).	Homburg (Hesse Homburg).
Adelheidsquelle (Bavaria).	Kreuznach.
Ischl (Austria).	Bath.

All which springs hold it richly in solution. And we have noticed, in a careful examination of the German analyses and accorded virtues of 1,045 foreign springs, that in proportion to the strength of the impregnation with this chloride are they celebrated for removing the severer forms of scrofula, induration, and obstruction; the chlorides of sodium and magnesium being generally associated with that of calcium.

But, considering how intimately associated with many forms of gout, scrofula, induration, glandular obstruction, &c., is a general constitutional debility, the combination of *iron* with the alterative chlorides seems of great importance.

Iron is so serviceable as a general tonic, promoting, as we shall show hereafter, the action of oxygen in the system, at the same time that it supports the strength under the evacuant action of the chlorides, that we cannot but regard the powerful combination of *iron* with the other ingredients, as one of the most valuable characters of the springs.

Referring again to page 137, we see the blood of an adult contains about 168 grains of carbonate of soda, and 40 grains of the tribasic phosphate of soda.

The action of the chloride of calcium on these ingredients may be thus represented; premising that, according to the laws of chemical decompositions,

168 grains of the carbonate of soda will require 174 grains of chloride of calcium for its decomposition,

Carbonate of soda	. 168	} FORM {	Carbonate of lime	. 166
Chloride of calcium	. 174		Chloride of sodium	. 186
Grains	. 342		Grains	. 342

By double decomposition.

And as 40 grains tribasic phosphate of soda contains 13·9 grains of soda, and 3·4 grains of phosphoric acid, the remainder being water—

Phosphate of soda	. 7·3	} FORM {	Phosphate of lime	. 6·8
Chloride of calcium	. 6·8		Chloride of sodium	. 7·3
Grains	. 14·1		Grains	. 14·1

We can then clearly comprehend, on such grounds, how great a change may pass upon existing chemical combinations within the living blood by the continued exhibition of the chloride of calcium; a change capable of reaching every part of the system nourished by the blood, which so soon as it is sufficiently impregnated must everywhere begin to act. For wherever the salts of soda enter into organic composition, there must the chemical force of the chloride, in feebly-vitalized parts, begin to enact new transformations. And these considerations amply suggest the effects of such waters as we describe, in dissolving, reducing, and ultimately removing a variety of indurations and glandular swellings. We might *predict* such results for all such waters. The celebrity, on the Continent, of those springs impregnated with this salt, just mentioned, is a satisfactory *verification* of the suggested operations of the chloride of calcium. Independently, then, of the other salts held in solution by the spring, it produces its full effect upon the constitution.

Suppose, however, on the other hand, that the carbonate of soda be *in defect*, a general *acid* state of

the blood existing, then the continued exhibition of chloride of calcium will act wholly upon the phosphate of soda, forming from this element of the blood, *chloride of sodium and phosphate of lime*. In this case, therefore, the principal change consists in the formation of phosphate of lime from the phosphate of soda. But phosphates are essential components of, and largely present in, the substance of the brain, nerves, and muscles, and are intimately concerned in their nutrition. Hence arises the suggestion,—that disturbance of the phosphoric elements of these components of the frame by the action of the *chloride of calcium*, may develop a new order of effects, not observed by the use of the other mineral ingredients already described, and—that according to the state of the constitution, it may act with a *nervine* power, which, by influencing nutrition and changing nervous action, may increase contractility, become *tonic, stimulant*, or even *irritant*. In corroboration of this view, it is known that disturbance of the nervous system is often accompanied by phosphatic discharges.

These considerations further suggest *inductively*, that *the chloride of calcium*, by promoting, according to this calculation, the transformation of these salts of soda into phosphate of lime, *ought not to be administered in what is called the phosphatic diathesis*. The changes, indeed, effected in the blood, as the chloride is not a natural ingredient of it, and suffers decomposition within it, show that it may become a powerful blood-remedy of a remarkable spanæmic, evacuant, or alterative character. (See page 136.)

Another very severe, and often very fatal variety of scrofula, is *TABES MESENTERICA*, mesenteric glandular

fever,* a disorder bearing the same relation to the glands of the abdomen, that consumption does to the lungs. Tubercles collect, enlarge, inflame, ulcerate, and give rise to hectic fever. "The chloride of calcium is a most efficacious remedy, checking the purging, diminishing the hectic, allaying the inordinate craving for food; and in many cases it has ultimately effected a complete restoration."

A distinguished writer sums up the observed effects of the chloride of calcium as follows:

"In *small* doses it promotes the secretions of mucus, urine, and perspiration. It operates, therefore, as a liquefacient. By continued use it appears to exercise a specific influence over the lymphatic vessels and glands, the activity of which it increases; for under its use, glandular and other swellings and indurations have become smaller, softer, and ultimately disappear altogether."

"In *larger* doses, the disorder of the nervous system is manifested by failure and trembling of the limbs, giddiness, small contracted pulse, cold sweat, convulsions, paralysis, insensibility, and death." He also says, "it has been recommended in chronic arthritic complaints (rheumatism), in bronchocele, in some chronic affections of the brain, and in other cases where the object was to excite the action of the absorbents. Occasionally, though rarely, it has been

* Indigestion, costiveness, or purging, irregular appetite, flushed cheeks, or a total loss of colour, impaired strength and spirits, remitting fever, and a hard tumid belly, with emaciated limbs, are amongst the most constant symptoms.—UNDERWOOD.

Mercury, antimony, neutral salts, soap, steel, and hemlock, and electricity, are the usual remedies for this fatal disease. We have examined the bodies of several children in whom the mesenteric glands were universally enlarged, some of them to the size of a nut.

employed externally." The professor here has entirely overlooked the common fact of mineral water-baths, naturally holding the salt largely in solution.

It produces cold, like the chloride of potassium, only in a greater degree, when dissolved in water; and used in crystals with about two thirds of its weight of snow, the salt forms with it an intensely freezing mixture.

Carefully reviewing the various properties ascribed to the action of this chloride when applied *separately*, and the known effects of springs combining it with salts not incompatible with it, so forming a harmonious combination, it is difficult to avoid the conclusion that the chloride of calcium produces, *independently of the other combinations*, those peculiar effects upon the constitution, such as we have described.

In most of the waters, *iodine* and *bromine* united with sodium or magnesium, give, to chemical tests, traces of their existence. Both these substances have powerful resolvent effects on glandular swellings. A circumstance recorded in one of the journals curiously illustrates the point. In one of the districts of Switzerland, hitherto free from that hideous deformity so prevalent in some of the Alpine valleys, *gôitre* suddenly made its appearance. After no little investigation, it was at last discovered that the disease had originated from the substitution of a new, and as it was supposed a more wholesome spring, for an old one which was now found to contain *iodine*. It is supposed that cod-liver oil owes to peculiar, though minute, combinations of iodine and bromine, its well-known anti-scorfulous properties.—(Dr. Owen Rees.)

The quantity of water used in testing for the iodide and bromide, by Professor Hofmann, was about twelve quarts of each of the chief springs* (1500 grains of saline residue being employed). In so small a quantity of water it was not possible to estimate the actual amount of iodine and bromine present. (See Report.)

Dr. Williams thinks that bromide of potassium possesses "unusual, if not specific, powers in the cure of diseases of the spleen."

There are also in the waters, as in the blood, traces of *manganese*: a substance which has an effect on the secretion of bile. Usually found, in mineral waters, combined with iron, it doubtless, in some measure, increases its salutary operation.

The *fluoride of calcium*, a component of the teeth, but found much more largely in fossil bones, exists in rather greater quantities. The *fluoride* was readily obtained "from 400 to 600 grains of the saline residue." "The etching was very rapidly effected and to a very considerable depth" by the action on glass of the hydrofluoric acid disengaged in the analysis.

Silica, another ingredient of the waters, enters into the formation of human hair, the blood, and some other parts of the body. In general, it sparingly exists in mineral springs. In the Starbeck Sulphur spa, the largest amount was detected; $1\frac{1}{2}$ grain. In the Geyser Spring, Iceland, it amounts to nearly 4 grains.

* Old Sulphur well, Montpelier Saline Chalybeate, Montpelier Strong Sulphur well.

GROUP VII.

(I.) THE ROYAL SULPHUR,

AND

(II.) THE MONTPELIER WELL.

(PRINCIPAL SALTS.)

	(I.)	(II.)		(I.)	(II.)
Chloride of sodium . .	866	803	Carbonate of lime . .	12	24
Chloride of magnesium .	55	54	<i>Sulphide of sodium</i> . .	15	14
Chloride of potassium .	64	5	Sulphate of lime . .	$\frac{1}{2}$	$\frac{1}{2}$
Chloride of calcium . .	81	62	Silica	$\frac{1}{2}$	2

(Grains per gallon in round numbers.)

Traces of fluoride of calcium.,, carbonate of manganese
and ammonia.*Traces* of bromide of sodium.,, iodide of sodium.
,, carbonate of iron.

Also existing in the water.

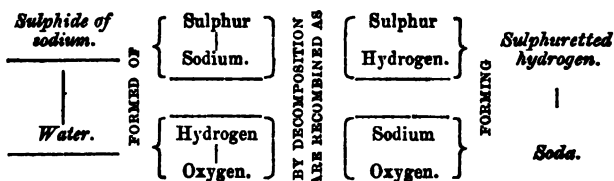
The *Sulphide of sodium* is the source of the sulphuretted hydrogen which is so plentifully evolved from these waters when exposed to the air. Its extreme tendency to form new combinations under the action of oxygen, is one of its most significant properties; a tendency which is always a striking feature of energetic action. The very slight chemical union of the sulphur with the sodium, a fact shown by the readiness with which all such waters give off sulphuretted hydrogen, renders the sulphide of sodium, in all cases, exceedingly free to form new combinations, in a nascent state, within the tissues of the body. And it does this independently of the other saline ingredients of the springs. But since rapidity of change and energy of evolution in general evolve celerity of physiological action, we possess, here, sufficient grounds for concluding:—That all sulphureous springs partake of the same properties, however modified by special saline

combinations :—That in all, the sulphureous element will be the predominant, the saline the subservient ingredients :—That just as mercury intensifies the specific action of drugs combined with it, mercury increasing the power of an aperient, the diuretic activity of a diuretic, and the expectorant quality of an expectorant, so the *sulphide of sodium*, the source of the sulphuretted hydrogen gas, gives increased activity to the special operations of the springs.

Dr. Armstrong, during a series of years, made extensive trials upon the action of the gas exhibited medicinally : “I have traced,” says he, “its operation from one organ to another, from the skin, joints, and eyes, to the viscera of the head, chest, and body. And the sum of my observations authorises me to declare that it is one of the most powerful antiphlogistic agents that can be used in disease ; and that it removes the chronic form more frequently than any other single expedient.”

We might also show how a portion of the sulphide, by the action of the hydrochloric acid of the gastric juice, instantly forms chloride of sodium and sulphuretted hydrogen. Hence, when the water is taken in an intensely acid state of the stomach, the change of the sulphide into the sulphur-gas takes place with great rapidity, and this explains the reason of the water sometimes severely affecting the head. The sulphide of sodium, introduced into the stomach by the sulphur-waters drawn fresh from the well, commands, according to the laws of chemical affinity, not less various transformations among the elements of organic life than any of the chlorides hitherto considered. The following diagram will, it is hoped, afford

a simple explanation of the action of oxygen upon the sulphide forming sulphuretted hydrogen and soda.



Now sulphuretted hydrogen being very soluble in water, and diffusing its effects rapidly through the system, is extricated from the system through the skin and lungs; and we might show by similar diagrams, how it is further changed by the further action of oxygen, into sulphuric acid and sulphate of soda, to be excreted from the kidneys; the sulphuretted hydrogen being, however, the principally-active agent, as formed within the digestive tube, by the aid of heat and the digestive powers.

Collating, then, the facts:—that the sulphureous element is so easily decomposed within the system, and so largely discharged through the skin, rapidly tarnishing the polished metals worn about the person:—that *sulphur* is engaged in the nutrition of the skin, the nails and the hairs of the body:—that all sulphureous applications have obtained a universal reputation for cutaneous complaints for thousands of years, whether as dissolved in mineral waters or otherwise administered, we have a good deal of evidence for concluding that the sulphureous element has a specific action on the nutrition of the skin. So also, sulphur enters largely into the composition of egg, to supply the feathers of the future chick: feathers

being a kind of covering in nature resembling hair. Now it can be well conceived, that in those cutaneous diseases which throw off vast quantities of scales, the system must, in time, become impoverished in sulphur; and hence the specific action of sulphur, when essentially required by the constitution, in curing such cutaneous diseases; just as steel, when the blood is impoverished in it, cures the disorders dependent upon the poverty of the blood.

Yet another point deserves passing notice. We mean the astonishing restorative effect of sulphuretted hydrogen dissolved in water, in a disease dependent upon a total arrest of the functions engaged in nourishing the tissues. Never has any more frightful form of disease been recorded in the history of medicine. Let us quote the words of BARON LIEBIG.—

“The deleterious and destructive agency of poisonous organic elements, has been clearly shown by the investigations into the effects of German sausages in a certain state of decomposition. Several hundreds of cases are known in which death has occurred from the use of this kind of food. The kind of death is preceded by very remarkable symptoms; there is a gradual wasting of the muscular fibre and of all the constituents of the body similarly composed. The patient becomes emaciated, dries to a mummy, and finally dies; the carcase is stiff, as if frozen, and is not subject to putrefaction.

“All the substances of the body capable of putrefaction, are gradually decomposed during the course of the disease, and after death, nothing remains except fat, tendons, bones, and a few other substances incapable of putrefying in the conditions afforded by the body.”

Herr Salzer communicated to the Baron a number of cases which occurred in Sausenbach, in 1842; besides the symptoms enumerated, Herr S. states, that the disorder declared itself by hoarseness, dryness of the throat, constipation, faintness, dilated pupils, impaired vision; perfect consciousness and unimpaired muscular motion still remained. He also states, that all the poisoned individuals to whom SULPHURETTED HYDROGEN WATER was administered early, were SAVED; its exhibition at once checked the morbid actions.

"The patient first perceived greater ease in swallowing, then the general tension and dryness diminished; the voice, which had been lost, returned; the skin became moister; the countenance lighter, and the pressure on the eye was removed."

"Ammonia afforded only temporary relief; chlorine diluted with water produced no improvement, rather aggravation."

Professor Pereira ascribes to it important properties. "It improves the secretions of the mucous surfaces, more especially those of the skin and glands, exerts a specific influence over the liver, and upon its peculiar portal circulation, as well as over the hemorrhoidal vessels. Thus, its sensible effects are those of an aperient, expectorant, sudorific, chologogue discharging bile, and emmenagogue, promoting periodical changes. If taken in large quantities it operates as a narcotic poison. Smaller quantities appear to undergo a kind of digestion and assimilation. But he considers it adapted only for maladies of a chronic character. It had been employed to check mercurial salivation, but is principally adapted for cutaneous, rheumatic, gouty, syphilitic, *bronchial*, hepatic and hemorrhoidal affections."

We cannot but think the considerations advanced in the present inquiry, a sufficient answer to the difficulty* already mentioned as urged as an objection against the independent virtues of such mineral springs as we have described. Having shown that the various ingredients, so elaborately and yet so harmoniously and transparently held in solution, are, many of them, powerful remedies even when applied singly, it is reasonable to think that such remedies acquire more extended medicinal powers administered so naturally in combination, than when separately applied.

It would seem that, against such evidence, the plea that mere change of air renders the actual medicinal effect of such agents altogether uncertain, is not warranted by the facts. The same persons who maintain this objection are willing to concede equally beneficial effects to the preparation of iron, to the carbonates of potash, lime, magnesia, &c., when compounded in the laboratory of the chemist, why then should similar virtues be denied them when prepared by the ever bountiful hand of Nature, whilst, indeed, such remedies, according to the admission of the objectors, are exhibited under the circumstances most favorable to their use, viz., pure air, new habits, change of scene, and complete mental relaxation?

We are free to confess, the arrangement of these facts into the form of an argument has greatly concentrated our confidence in the good effects of both change of air and the use of the waters; we believe the change would, in many cases, be far less efficacious without the waters than the waters without the

* See page 131.

change; that both combined produce a sum of good effects which one alone could not accomplish.

Having inquired into the medicinal properties of the remedies held in solution in the springs, when applied separately, we have now to consider their effects when used in the various combinations, presented by the hand of Nature, always a benefactress to him who carefully follows her behests, but a stern avenger to every slave of impulse who violates her laws.

That we cannot too highly estimate the good effects of a salubrious change of air, fine weather, a healthy state of the skin, and a judicious employment of bathing in general—the natural means of sustaining the general vigour, the *mens sana in corpore sano*—is a truth of such universal acceptation in principle, and yet so much neglected in practice, that we have thought an effort to illustrate more closely their intimate relations to the state of the blood, the nerves and the secretions, terms which are other words for one expression, *the general health*, might awaken some, at least, to the danger of neglecting such all-important influences.

In connection with the subjects discussed in the second and third parts, we shall hereafter have to notice how much of the benefit derived under a course of the *sulphureous waters* is due to that improved condition of the skin, following their general employment.

THE HARROGATE SPAS.

PART IV.

THE MEDICINAL USES OF THE WATERS.

PART IV.

THE MEDICINAL USES OF THE WATERS.

CHAPTER I.

CHALYBEATE WATERS.

THE ancient physicians, unacquainted with the wonderful phenomena of the blood, its circulation, its pale and red blood-globules and chemical composition, were destitute of the means of accounting for the curative power of steel springs, except by whimsical and unfounded dogmas.

In the present day, the eye, assisted a thousand fold in its penetrative power by modern microscopes, is enabled to watch the behaviour of the blood, drawn by a needle's point. Under the use of steel springs it may be sometimes observed gradually becoming enriched with new treasures of these globules, at the same time that improved health, vigour, and complexion correspond to these changes in the condition of the blood shown by the microscope. Such vivid changes effected among the blood-globules by the agency of chalybeate springs, forcibly suggest the more general principle of BLOOD MEDICATION, accomplished by the use of other mineral elements absorbed into the blood. On the possibility of medicating the blood depends the treatment of several important diseases,—such as scrofula, incipient consumption, chlorosis, gout, some forms of jaundice, and skin disorders. For constitutional disorders and derange-

ment of the general health are intimately connected with the state of the animal fluids. It is impossible for unhealthy, impoverished blood, to supply the demands of the vigorous actions of any part of the frame, whether of the muscular, nervous, or secretory systems. But whatever be the condition of the system, the action of the whole can only be carried on by a rapid supply of oxygen. It matters not how pure, healthy and rich, be the elements of the blood, this agent alone can develop the vital forces. Whatever favours the supply of oxygen, exhilarates and stimulates the whole system.

Now, as it is one office of the blood-globules to draw oxygen from the air, it is plain that when, in disease, they have become much diminished, the blood is deprived of its proper supply of oxygen. Hence, all the functions proportionately languish. The sensation of want of breath is not relieved by a panting respiration. The lungs do not execute their usual office. Deficiency of blood-globules is always accompanied by an indescribable desire for air within the lung, which the air does not, and cannot satisfy, especially during exertion.

One of the chief uses of steel as a medicine is to enrich pale blood with red globules, and thus greatly to increase the absorption of oxygen from the air. Persons suffering from a deficiency of oxygen through poverty of the blood, generally experience shortness of breath, hurried respiration during any exertion, palpitation of the heart, and faintness. Nervous distress at the least excitement or surprise, disturbed sleep, giddiness, violent pains in the head, and often in the left arm and left side, pain after food,

weak stomach, chilliness, cold extremities, blueness of the skin from cold air, partial numbness, and twitterings at the heart or the chest, are common symptoms. They sigh frequently, experience an inexpressible fear or presentiment, and "melancholy claims them for its own;" most of the secretions are deranged, because the weak blood is incapable of supplying their necessary materials. This is frequently the case with the gastric juice which no longer prevents fermentation in the stomach, and is very apt to generate acidity. But the particular symptoms pronounced by the three grand systems of organic life, are as various as the physiognomy of the sufferers in this disorder.

MEDICINAL USES OF THE CHALYBEATES.

Natural steel springs may be recommended in disorders of exhaustion, and those arising from excessive losses of blood and from exhausting occupations, and in protracted convalescence in general. Hysterical affections, nervous disorders, St. Vitus's dance, tic douloureux and excruciating darting pains in the head and face or limbs, are all adapted for a trial of steel springs; when indicated by general paleness and absence of feverish excitement. And to these may be added, disorders of relaxation accompanied by copious discharges from the mucous membrane, where an astringent and tonic effect is desirable.

A high reputation has also been earned by the *diuretic* quality of weak steel springs; a quality which renders them highly serviceable in some forms of gravel: ulcers in the kidneys have been relieved, and even small stones have been frequently discharged in large quantities by their use.

Steel springs are particularly adapted for a great variety of disorders incident to the weaker sex; in general, however, a florid complexion renders them inapplicable. The great Boerhaave remarks, "no diet, either animal or vegetable, no regimen can produce the effects which, in these cases, are accomplished by steel."

The medicinal properties of the chalybeate waters may be thus tabulated:—

<i>Hæmatic,</i>	<i>Vulnerary,*</i>
<i>Astringent,</i>	<i>Splenetic,*</i>
<i>Tonic,</i>	<i>Cleansing,*</i>
<i>Diuretic,</i>	<i>Uterine.*</i>

Referring the reader to the chapter on the directions for the use of the waters, we nevertheless extract Dr. Deane's pertinent remarks:

"For not only physic and medicines, but also meats and drinks, taken disorderly, out of due time and without measure, bringeth often-times detriment to the party, who otherwise might receive comfort and strength thereby. So likewise, this water, if it be not drunk at a convenient season, in due fashion and proportion; yea, and that after preparatives, and requisite purgings, and evacuation of the body, may easily hurt those whose infirmities it doth principally respect. For medicines ought not to be taken rashly and un-

* Used locally as well as internally pure chalybeate waters have been successfully applied to heal fistulous wounds, *in perineo*, after the operation for the stone; in chronic inflammation of the eyes; and in enlargement of the spleen. The extreme purity of some of these waters, the total impregnation in the gallon not exceeding the purest spring water in use, greatly favours their absorption and rapid passage through the kidneys, cleansing the blood, when drank largely, fasting, of much of the *débris* of organic waste of tissue. For some forms of barrenness and uterine obstructions, the steel waters at Spa have been much resorted to.

advisedly, as most do, hand over head, without any consideration of time, place and other circumstances; as that ignorant man did who, getting the receipt of that medicine wherewith formerly he had been cured, made trial of it long after, for the same infirmity, without any help or good at all; wherewith greatly marvelling, received this answer from his physician: 'I confesse,' said he, 'it was the selfe-same medicine, but because I did not give it, therefore it did you no good.'"

It is not many years since a gay procession, enlivened by a band of music, proceeded to the Sweet Spa,* at High Harrogate, for the purpose of bestowing upon it, as it was supposed, the more appropriate title of the ROYAL CHALYBEATE, under the idea that it was the *strongest steel well in the place*, and one which had performed such wonderful cures as to bring Harrogate into note.†

Thus summarily was the "Old English Spaw," or Tewit well deprived of its pre-eminence. But as it is the oldest steel well in England, in use long before the Tunbridge wells; as it was the first chalybeate water written upon by an English physician; and as it was the true origin of Harrogate and *the* well which rendered the place so famous of old by its cures, we think it interesting to rescue its reputation from so singular an eclipse.

Now for two centuries before, and some years after this little affair, the Tewit well retained the property of striking a ruby colour with galls; and during the

* Called also the Old Spaw, and John's Well.

† See Dr. Hunter's Treatise on the Waters. 6th Ed., p. 26.

last 120 years, the Sweet Spa has generally shown a less chalybeate impregnation than the Tewit, which still retains its original character: a fact probably owing to its water being supplied from a deeper source than the more superficial Sweet Spa.

We were surprised, in 1851, to find the Tewit Well nearly three times more powerfully chalybeate than the Sweet Spa, and on searching into the experiments of old writers, we found its superior strength generally acknowledged.

"Notwithstanding, for a manifest and fuller trial hereof, put as much powder of galls as will lye on twopence or threepence, into a glasse full of this water, newly taken up at the fountaine, you shall see it by-and-by turned into the right and perfect colour of claret wine, that is fully ripe, clear, and well fined, which may easily deceive the eye of the skilfullest vintner" (1626).—DR. DEANE.

"The oker in this spaw is much deeper colored, heavier, in larger quantity, and of a more ferruginous quality than in the Sweet Spaw."—DR. SHORT, 1633.

That the Tewit Well is the most ancient English chalybeate spring in general use, appears from several writers, but it may suffice to quote the last-mentioned physician, who, from the distinguished position which he held, deserves great respect.*

"The most noted and ancient of those is the Tewhit Spaw, at Harrigate, which was first discovered by one Mr. William Slingsby, about the year 1571, and was wrote upon by Dr. Dean, of York, 1626." . . .

* At a meeting of the Council of the ROYAL SOCIETY (Sept. 17, 1733), ordered, "THAT *Dr. Thomas Short* be desired to print his '*Natural History of the Mineral Waters of Scarborough, &c.*' HANS SLOANE, PRÆS. R. S."

"It is a great pity that these noble fountains should sink in their due reputation. And, indeed, this will not be the fate of this only, but all other most celebrated waters, in a little time, these places being no longer the Hospital of Invalids, but too often the rendezvous of wantonness, and not seldom of mad frolicks, which should be the shame of human Nature, and all rational minds, as they are the contempt of sober men. That temperance, moderation, and a strict proper regimen, which people were then willing to comply with, are now turned into ridicule. *Hence the poorer people of mean circumstances, and such as have the fortune to board in clean poor people's houses mostly find relief; but the rich seldom.* Luxury, intemperance, unreasonable hours, idleness, gratification of taste and appetite, are become so fashionable."—DR. SHORT, 1733.

"The Tewit well is rather more strongly impregnated with the principles from which these waters derive their virtues, than the Old Spaw (Sweet Spa)." —DR. GARNETT, 1794.

In 1852, we found their relative strength as follows :—

SWEET SPA.				TEWIT WELL.*			
Oxide of iron	.	.	‡	Oxide of iron	.	.	2‡

And from Professor Hofmann's Report, of 1854, it appears that the Tewit water contained rather more than double the proportion of oxide of iron than the Sweet Spaw.

* Quoted from 1st Edition of 'The Harrogate Spas,' 1853, p. 130.

CHAPTER II.

THE IMPERIAL CHALYBEATE SALINE.

(Cheltenham Room.)

THE term "The Cheltenham Water" was strangely enough applied to this spring, in consequence of the mistaken idea that it was similar to the waters of the Gloucestershire Spa. We have endeavoured, in a previous edition, to expose this mistaken notion, and to attach to this justly-celebrated spring its own and proper value.

And, indeed, for many years, Harrogate has sustained no little loss in consequence of its peculiar properties being misunderstood. The character of the waters at Cheltenham being attributed to this water of Harrogate, visitors naturally expected to procure at Harrogate the same effects that were experienced at Cheltenham, but were necessarily disappointed in their expectations. It was said to resemble Cheltenham water in being an aperient: but after its improper use, one person was troubled with a headache, another felt a dizziness and fulness of blood in the head, another perceived oppression in the stomach, and another made the discovery that, so far from acting like the Cheltenham waters, it produced a diametrically opposite result, and rendered the hated pill-box and draught more necessary than ever. Such sensations were the direct result of obeying the directions of the distant practitioner, who had, in the simplicity of good faith, despatched his victimised patient to drink the so-called Cheltenham water.

Under these circumstances let us recall the eulogiums of the original discoverer. Writing in the month of May, 1819, he, with no little satisfaction, states that the number of persons who had taken the saline chalybeate water, had increased beyond his most sanguine expectations, and that upwards of seventy were using it daily with the most beneficial results. Fortunate, indeed, was it for its believing votaries, that this rare gift of Nature happened to cure them. But we are afraid that the result must have been owing rather to good luck than to accurate knowledge of the virtues of the spring. For no correct analysis had as yet appeared. And, indeed, such cogent matters as Epsom salts and Glauber's salts, so abundant at Cheltenham, were doubtless not omitted by Nature from the Harrogate spring without a reason. At Cheltenham, Nature had collected powerful combinations of the drastic salts, affording a certain means of sweeping the alimentary tube. But at Cheltenham steel is nearly absolutely omitted. And at Harrogate, according to our analysis, an analysis corroborated by Professor Hofmann, the *soi disant* Cheltenham water is completely and entirely opposite in character to its supposed prototype. Here the chloridal salts abound. Carbonic gas, the animating gas of champagne, holds in solution a rich impregnation of steel, the richest on the spot. And, associated with these, it suspends the light digestive salts, the carbonates of lime and magnesia. Can any two things be more widely different than the characters of these two springs?

Glancing at the GROUPS V, VI, and considering their very different proportions of impregnation with the various chloridal salts, we can judge how great

a difference exists in their corresponding medicinal actions. If, indeed, we take the sum of those salts, only in each which give an aperient effect to the waters, we obtain from the analyses of—

THE IMPERIAL CHALYBEATE SALINE.		MONTPELIER SALINE CHALYBEATE.	
Chloride of sodium . .	159	Chloride of sodium . .	657
Chloride of calcium . .	52	Chloride of calcium . .	159
Chloride of potassium . .	27	Chloride of potassium . .	11
Chloride of magnesium . .	34	Chloride of magnesium . .	36
Total purgative power . .	272	(In grains per gallon) . .	863

A comparison which shows that the Montpelier spring has an amount of purgative salts at least three times greater than the Imperial spring. We see, therefore, into how great an error have all those writers fallen, who describe them as having the same effects. When taken under similar circumstances, they produce very different effects on the same person. From the data already laid down we may arrange, under the following heads, already discussed in detail, the properties of—

THE IMPERIAL CHALYBEATE SALINE.

(a.) By the combined action of the *four chlorides* in moderate doses, it produces very gradual changes in the blood. Contributing, when required, to the constitution, the soda, lime, *iron*, and magnesia, so essential to its composition, it acts as a *hæmatic*.

(b.) And, by promoting generally, the secretions, principally through the kidneys, the most powerful of the cleansing organs of the frame, and next through the skin, by the increased stimulation of the general

circulation, the spring answers the purpose of a mild *depurating* agent, purifying at the same time that it enriches the blood.

(c.) As an alterative gradually influencing the state of the system, it has a beneficial effect on the strumous constitution, indicated in general by a tendency to rickets, glandular swellings, consumption, mesenteric derangement, &c.

(d.) As a spanæmic, the saline combinations of the spring prove *solvent*, breaking up, in favorable cases, the effete matters accumulating in the system; especially in atonic, irregular, and wandering gout, when the blood, deficient in vigour, cannot sufficiently stimulate the system to relieve itself by a regular attack of inflammatory gout; and in other allied derangements.

THE EVACUANT powers of the spring are principally exerted as a diuretic, and secondarily as a diaphoretic, acting through the skin; indeed, it very rarely operates directly as an aperient or an emetic.

But far more obvious are its effects as a NERVINE remedy. The increase of nervous energy experienced, in suitable cases, by the continued use of the water, proves its general *tonic* powers. And as it is by far the richest chalybeate of all the Harrogate springs, the full operation of the carbonate of iron, dissolved in the most soluble form by carbonic acid gas, aided by *tonic doses* of the chloridal salts, induces by degrees a powerful change in the action of the nervous centres, increases the muscular vigour in general, confers a firmer tone upon the contractile power of the minute vessels, and thus facilitates the microscopic circulation of the blood in debilitated parts of the system.

It thus becomes, after a time, a powerful *stimulus*, which, as it depends not upon temporary excitement, such as that produced by alcohol, but upon increased nervous energy, due to an invigorated state of the blood, is not of an evanescent character.

But though, for the sake of perspicuity, we can arrange the medicinal operations of the spring under these several terms, it is not to be supposed that such operations can be accomplished independently of one another. The human frame is one body, formed of no independent members or systems. If one member suffer, the whole body suffers, linked together in the bonds of an indissoluble sympathy. But for convenience of expression we may state, generally, that the disorders remediable by this, and, indeed, all the Harrogate springs, are those connected with *the blood*, *the nerves*, and *the secretions*, the vital actions of which are inseparably related. Of these three, the blood supports the nerves, and both govern the last. Thus the severest forms of indigestion sometimes follow great losses of blood; so do "*tic*," convulsion, and palpitation. The most terrible case of *tic douloureux* we ever witnessed, a form which no remedies tried by the most distinguished physicians ever relieved, followed, and in all probability was caused by, the imprudence of a young surgeon, who, imagining that the heart was diseased, for a space of some months almost daily drew blood, until such exhaustion followed that an old physician, who was called in to the case, quietly remarked, "that, for his part, all he could recommend was a beef-steak!"

How closely disorder of the secretions is really connected with either the state of the blood or the

nerves admits of but one opinion. Who knows not the influence of mind acting through the nerves upon the bodily organs? There are some persons, happily for the peace of society, who are compelled to restrain the passionate and frantic ebullitions of temper by the dread of paralysis, jaundice, or indigestion. And it is a matter of daily observation, that interruption to the functions of the various secreting organs is a most prolific source of severe constitutional derangements.

In speaking, then, of the disorders of the blood, the nerves, and the secretions, we adopt a concise phraseology to denote those changes, more or less complicated, found to be inseparable from derangement of the general health.

In the early stages of such derangements one only, or perhaps two, of these cardinal systems become primarily affected, but soon the whole becomes more or less implicated. By imperceptible degrees, like the invisible motions on the sun-dial, the decline from the meridian of health is only noticed by comparing the present with the past. It is this slow change in the constitution which, though it eludes the perception of the subject of it, is yet only too manifest to occasional observers; a circumstance which most decidedly distinguishes the march of chronic disease from the onset of the acute form.

It is observed in chronic poisoning of whatever kind, in the insidious approach of decline, consumption, tabes mesenterica, in several blood diseases, and in nearly all structural disorders of vital organs.

These waters are adapted for assisting the restoration of the general health, in certain forms of its derangement, connected either with the condition of the nervous, the circulating, or the secretory systems. However declining health has originated in one of these systems, it is not long before a triple disorder of all these is established. Most commonly it commences in the nerves. "THE PLAY OF THE PASSIONS," excited in such an age as the present, in so much subtlety of invention, so much hardihood in speculation, and so much enterprise in a world-wide princely commerce, necessarily overstrains the brain, the organ of thought, and the nervous centres, which are the seat of the emotions. All the world is living too fast. The nervous fluid, wasted by excessive action, cannot be accumulated by sleep, air, exercise, and food, so fast as it is expended. Exhaustion necessarily follows. The secretory organs, deprived of the normal transmission of nervous fluid through the organic nerves, cease to act with their wonted energy. Organic life necessarily falters in function. The particular part pronouncing its distress—the liver, or perhaps the stomach or kidneys in hard drinkers and high feeders, the heart in the grieved and disappointed, or the brain in the over-wrought student, one or each, in its own time—utters its peculiar symptoms originating from the same cause.

The secretions dependent upon the same vital energy, transmitted by the organic nerves from the various ganglions, become equally deranged under the general nervous depression. The blood, wholly maintained in its purity by the exertions of the secretory apparatus, cannot long remain superior to these

adverse influences. Hence, we cannot doubt the fact, that excessive exhaustion of the nervous energy must, sooner or later, be followed by a *triple* disorder of the general health, involving the three systems of the nerves, the secretions, and the circulation.

Again, whilst the actions of the nervous systems are over-stimulated by the play of the passions excited in the thousand anxieties of modern enterprise, soothing medicines, while the fag of the brain continues, may stifle, as it were, those cries of indignant Nature, benevolently intended as safety-signals of danger ; they may postpone, but they cannot prevent the coming struggle between the forces of life and the forces of decay.

The earliest traces of these constitutional derangements are displayed in the face, which reveals to the practised eye, by its change of colour, expression, and form, the extent to which the triple disorder is already established. So soon as the deranged secretions begin to compromise the quality of the blood a cachectic sallowness is inevitably declared. Then follows in its train a chronic disease ; unless a sudden illness, more or less prolonged, constitutes happily a critical and successful effort of the *vis medicatrix Naturæ* for the restoration of health.

In application of these principles let us notice some of the special disorders by which such constitutional derangements as we have noticed are manifested. And first, as regards—

Struma and glandular obstruction.

Do we not sometimes see a fond and devoted mother

with the most anxious solicitude watching a gradual *palleness*, listlessness, and attenuation, insidiously stealing over the once blithesome, cherub-like features of an only child? She remarks that once rounded, gay, and sprightly form becoming angular, spiritless, and dull. But no disease as yet appears, the child is evidently ill, but complains of no pain; the appetite is rather increased, but emaciation proceeds. Means of relief are not left untried, but all is often in vain. When nutrition is arrested death advances with slow but steady steps.

It is plain that improved nutrition, secretion, and circulation, are here indispensable to arrest this complicated affection. Steel, to support the vigour, to reproduce the red particles where deficient, and to favour the play of oxygen; the chloridal salts to dissolve, liquefy, and excrete the lymph obstructing the glandular circulation; a bracing atmosphere and the resources of bathing; these are means likely to be of the greatest service for removing this complaint.

The anatomical character of the seat of this disorder has been beautifully described:—

“Thus where the veins their confluent branches bend,
And milky eddies with the purple blend;
The chyle’s white trunk, diverging from its source,
Seeks, through the vital mass, its shining course;
O’er each red cell and tissue’d membrane, spreads,
In living net-work, all its branching threads:
Maze within maze, its tortuous path pursues,
Winds into glands, inextricable clues;
Steals through the stomach’s velvet sides, and sips
The silver surges with a thousand lips.”

The simplest kind of glandular obstruction appears in the formation of small tumours about the neck, the

axillæ, and the groins; always signs of a debilitated state of the constitution. The blood is generally impoverished or otherwise changed in such cases, the red particles in the blood being visibly defective. We had the pleasure, not long since, of curing a lad of a large strumous tumour by the use of chalybeate medicine, together with cold ablution.

Most frequently the glandular obstruction is caused by an excess of fibrin* or animal glue in the blood, which literally obstructs those winding "inextricable clues" composing the glands through which the digested food, or *chyle*, finds its course into the blood. Nature, however, doubtless to fulfil some important objects, has so arranged its course that the new material about to be mixed with the blood shall be first submitted to the circulation within the lungs, there to be intimately associated with the absorption of oxygen. The future blood, or *chyle*, is therefore a link connecting these mazy glands with the lungs. The same disease, therefore, already fixed in the glands, and making but a step in advance along the tract of the streaming *chyle*, falls upon the lungs. Does not this circumstance explain the relation between the tubercles so frequently found both in the lungs and the abdominal glands; both being due to defective assimilation in the course of the *chyle*?

These facts are sufficient grounds for employing in the early stages of the tuberculous constitution such remedies as are found to ward off the blood-disorder on which it depends. Whether tubercles be forming in the glands or in the lungs, the same cause

* A principal fact established in Dr. Glover's 'Fothergillian Prize Essay on Scrofula.'

operates in both, and assuredly remedies which prevent or relieve their formation in the former instance may be reasonably used in the latter.

The celebrated Fothergill, with his usual sagacity, referring to the early periods of undeclared consumption, observes :—

“ A mineral water which possesses the power of pervading the lymphatic system, and of disburthening the lymphatic glands in remote parts of the body, by promoting an increased secretion from the intestinal glands, and that without heating or weakening the frame, seems of all others the most likely to answer the intention ; the small portion of iron contained in the water need not be dreaded on account of its supposed heating quality, which is effectually obviated by a portion of cooling salts sufficiently diluted.”

Another form of blood-disorder and one, indeed, which we often have to treat, is characterised by trifling derangement of the secretions, by much pain in various parts of the frame, by great disturbance in the nervous system, but, above all, by every appearance of a deteriorated condition of the blood. We have had many such cases under our care, in which tonics of great variety, especially steel and bitters, assisted by the most liberal allowance of nourishing food, and spirituous stimulants, had been all previously applied without increase of strength or health.

Lassitude, extreme sensibility, and in females, proneness to tears ; the nerves shaken by trivial causes ; startings occurring at the least surprise, noises of all kinds distressing ; fears exaggerated, animation lost ; energies depressed—such have we observed to be, in many cases, the common symptoms of the asso-

ciated nervous disorder. Why should *tonics*, sedatives, a nourishing, stimulating, and yet careful diet, have so often failed to give relief? And why, in many such cases, should chloridal steel springs, of the kind we are now discussing, succeed, when so much judicious treatment by ordinary drugs has failed? The answer must, we think, be sought for in the blood-remedial powers of the chloridal salts.

The blood disorder frequently originates in impaired nutrition,—imperfect elaboration of the blood from defective nervous energy in the organic nerves—a common consequence of over-working the brain and other nervous centres. A sedentary life, confined air, and very long continued application to business with *anxieties* such, perhaps, as no former age has witnessed, all tend to still further disorder the health.

We have observed many in this condition who are in the habit of repairing to the waters for renovation and a pleasant holiday. In many cases, such persons certainly find very satisfactory improvement from being continually out of doors, being much on foot, or driving about, and, for a few weeks, by taking plentiful morning draughts of the old sulphur well. But we have observed that this is not always the case. We have heard the greatest surprise expressed that the same sulphur-water which formerly seemed entirely to set up the health for the next year's campaign, now was gradually failing in its former effects.* We shall illustrate this interesting point by an example.

* In no wise due to any deterioration in the sulphur-water, for that is stronger than heretofore.

CASE V.—*Over-worked nervous system, secretory torpor, and deterioration of the blood.*

A gentleman, engaged during ten months in the year in scholastic occupation, for many years has been in the habit of taking a course of the strong sulphur-water, with so much benefit at Harrogate, during the summer, that he had for a long time required, during the holidays, no other means of restoration. In 1853, he first came under our professional notice. We remarked in his aspect the usual signs of a low, and at the same time loaded or impure, state of the blood. He was stout, swarthy, sallow, and what is called "bilious," in appearance; enervated, depressed, and dull. He had already, for some days, persisted in his old plan of drinking the sulphur-water, intending to continue it as usual, as on former visits.

It was evident, however, that this plan was now unsuitable to him. He was reaching a climacteric period of life. His powers of making blood were reduced. The blood itself was significantly *below par* already. The stimulating, depurative, and reducing, purgative action of the strong sulphur-water, would, indeed, for a time, impart fresh feelings of alacrity, while the stimulus lasted, but depression would follow. With the greatest difficulty, after demonstrating to him by the microscope the altered character of the blood, he was prevailed upon to change his former plan. With many doubts and misgivings, he began to take the Imperial spring vigorously, and with results that so much surprised him that he completely revoked his obstinate opinion.

The benefit, indeed, of this plan was greater than

he had ever before experienced. And as his old remedy, the sulphur water, was now failing him, in which he had trusted for so many years, his grateful demonstrations of pleasure at the discovery of a new mode of invigoration, were expressed with so lively an animation as to leave a vivid impression on our mind of the peculiar importance of modifying the accustomed course of the waters, on reaching the climacteric periods of life.

The general properties of the ingredients already discussed, enable us further to notice several forms of disorder calculated for relief by these waters.

Disorders of the Spleen.

Enlargement of the spleen is a common effect, in India, of remittent fever, and also in this country, of ague. In the year 1841, a student suffered a great many attacks of ague. They seized him suddenly, indifferently whether at home or travelling. For years after these attacks had ceased, he remained subject to a deep-seated pain in the left side. After many unsuccessful measures, he repaired to a water-cure establishment, and underwent hydropathic treatment at different times, for a period of about seventeen weeks, with no relief. He then, one day, consulted three eminent physicians in succession; each urgently recommended some preparation of steel, each, independently and unknown to the others, taking the same view of the case. He immediately commenced a vigorous case of chalybeate medicine, which completely cured him, under very unfavorable circumstances, as he was then working laboriously at

a hospital, and in the dissecting room. The complaint has never returned.

The spleen, when the circulation is under sudden pressure, is thought to fulfil the office of an elastic reservoir for the blood, and when the cold stage of the ague drives the blood forcibly inwards, it sometimes becomes congested, in a state which is the cause of its enlargement. It is one of the most common results of Indian life. The Indian reader will doubtless recollect the KALA NIMUK, or black salt of the Bazaars, sold throughout India, as an established remedy for enlargement of the spleen; but he will be surprised to learn that it is composed of the following ingredients, viz. :

Chloride of sodium	222 grains.
Sulphur	7 "
Chloride of calcium	6 "
Black oxide of iron	3 "

That such a combination has been decided upon after centuries of experience, gives a strong presumption of the value of the saline chalybeate and sulphur springs, for the relief of congestion of the spleen. The KALA NIMUK is exhibited in the morning, a purgative formula being given overnight, of sufficient strength to move the bowels twice or thrice daily. The formula used for this purpose in the Native Hospital, Calcutta, for half a century, (composed by Mr. Shulbred,) is quoted below.* Rubefacient liniments,

- * *Powdered rhubarb,*
- Powdered jalap,*
- Powdered calumba,*
- Powdered scammony,*
- Bitartrate of potash,* of each one drachm,
- Sulphate of iron,* half a drachm.

change of air, quinine, are also employed.—MARTIN, 'On Tropical Diseases.'

Congestion of the liver, on the other hand, cannot be suitably treated by this water. The spleen, unfurnished with secretory ducts pouring out a secretion, and its function, except as an elastic reservoir, is totally distinct from that of the liver, which, on the other hand, fulfils a variety of offices in the animal economy, and therefore, the measures which will successfully relieve congestion in the one organ cannot remove congestion in the other. That of the spleen may depend upon local debility of its elastic tissues, which, by the aid of tonics, chalybeates, and evacuants, may generally be reduced to its normal size ;—a result not similarly attainable when the liver is congested ; the circulation of the blood through it being entirely different from that within the liver.

TORPOR OF THE LIVER is wholly distinct from a state of congestion. We hear enough, nowadays, of torpid livers, which are not cases of torpor at all, but congestion. Real torpor of the liver, denotes a diminished secretion of bile from the blood circulating through the liver. Now, if it be true, that normal, healthy bile, can only be produced by the secretory glands of the liver, by an adequate supply of sufficiently rich stimulating blood and nervous energy—in vain must we expect mercury to excite the healthy secretion when the blood is deficient in the necessary qualities to produce it. Hence it comes to pass, that those originally suffering from congestion, suffer at last, by the free use of a mercurial stimulant (which is in truth, "taking a dram" for the liver), from the exhaustion of over-stimulation, a far more formidable disorder.

First, because the frequent use of mercury, by over-exciting the liver, induces a torpor calling for stronger stimulation ; a torpor which is the necessary result of excessive action. For alternate states of activity and comparative rest are fundamental conditions of healthy action, but especially of the nervous system and primary secretory organs ; and so, the over-stimulated liver relapses at length into a state of inactivity, inconvenient, it is true, but still an unavoidable result. If people will further disorder their livers by excessive pleasures of the table, indolence and inattention to the skin, they render the artificial stimulus afforded by the blue pill and black dose necessary, indeed, for present comfort. But this state of things cannot last for ever. Congestion, or fulness of the liver, by degrees gives way either to enlargement or a state of atony, in both cases often associated with torpid function. But of all the causes destroying the health, a really torpid liver is the most fruitful in the variety of its harassing consequences. Dyspepsia, nervousness, hypochondriasis, &c., &c., follow thick and fast in its wake.

Secondly, because, being extensively engaged in maintaining the assimilating function by its secretion of bile out of the blood, in aid of the blood-manufacture from the food, the liver sinks into a state of comparative weakness, when it is *itself an ill-nourished organ*. The conditions requiring the formation of healthy bile are, first, wholesome food ; secondly, nervous energy ; next, a supply of vigorous arterial blood, and above all, a free circulation of the black venous blood pouring from all the digestive organs through the liver into the lungs. Torpor of the liver, there-

fore, may follow, deficient nervous influence and a deficient supply of the red globules of arterial blood.

Thirdly, because the continued use of mercury still further reduces the quality of the blood, which, when notably impoverished, renders the formation of sufficient healthy bile impossible.

For these reasons, torpor of the liver, when associated with a reduced state of the blood, can only be overcome by remedies which tend to raise it to the healthy nutrition standard. At the same time, just as it is inexpedient suddenly to withdraw the accustomed stimulus from the habitual drunkard, so when the liver has become habituated to stimuli, it is often necessary to accompany the restorative process by the most eligible remedies we possess, such as Taraxacum, the sulphur waters, or the chloride of ammonium. In many such cases the Imperial spring, and, indeed, the Montpelier, proving greater or less blood robbers, gentler or stronger alteratives, more powerful or weaker tonics, according to circumstances, act in a very favorable manner. In some cases, we give a decided preference to the Montpelier water. But it is impossible to lay down general rules to suit all the varieties of individual disorders.

INDIGESTION, for similar reasons, when caused by deficient functional power, may be called a torpor of the stomach. But, as more various disorders exist in the functions and structures of the stomach, than of any other organ, except the skin, we ought to remark that the kind now more particularly referred to, is *atonic indigestion*.

General disorder of the blood, whether simply impoverished, or besides this, impregnated with impuri-

ties, commonly affects the stomach in various ways ; in these cases, all those remedies fail to give relief which are addressed to the indigestion only.

The disordered blood occasions the secretion of a disordered gastric juice : from this defect, fermentation of various kinds, acetic, and putrefactive, take place in the digesting food, incompatible with healthy digestion : gases are extricated causing flatulence ; undigested food, delayed in the stomach, gives rise to cramp and spasm ; whilst the delicate membrane of the stomach itself becomes irritated by the distension and acidity of the fermenting mass. The gastric acid is poured forth in excessive quantity, and, when intensely acid, excoriates the fauces during eructation. Palliatives are of little use. The weak stomach depends upon the weak blood. The cure of the latter can alone remove the derangement of the former. Healthy gastric juice requires the presence of blood of a certain quality and richness for its just formation. The sympathies of the stomach, surrounded as it is with ganglions communicating with every part, are so intimately connected with the skin, the liver, and the brain, that it can scarcely ever be said to perform its duties aright, when any of the larger organs are much in fault. Hence the difficulty of curing indigestion by simple measures. In the form now contemplated every means of improving the general health, such as exercise, regimen, bathing, travelling, &c., will be found more beneficial than mere dosing the stomach with medicines.

Atonic dyspepsia is a common accompaniment of torpor of the liver. Impoverished blood, especially when contaminated with decayed matter, can furnish

neither healthy bile, nor perfect gastric juice. The indigestion and the liver-disorder go hand in hand. The bilious affection may precede or follow the dyspepsia. The best remedies for this kind of indigestion, arising from impurities and poverty of the blood, are those which at once cleanse and enrich the vital stream from which the gastric juice is derived. It is for this reason that many mineral springs of an alterative, depurating, yet *tonic* character, are celebrated for certain forms of *indigestion*. Yet, without doubt, there are many circumstances which render them inapplicable.

The reader, if the subject of dyspeptic distension, will excuse a digression here made in his favour. A remedy introduced from France, is deserving of very great eulogium. We mean freshly prepared powdered charcoal. This substance possesses the unexplained but singular property of decomposing noxious gases disengaged during any putrefactive process. A dead animal, placed between two layers of charcoal in a box, disappears by its agency, except the mere skeleton. The charcoal absorbs and decomposes the emanating gases so effectually that, though the box be kept for months in a room, no odour is perceptible.

On this principle, ten or fifteen grains of powdered charcoal made into lozenges, or pills, form a remedy for flatulence arising from imperfect digestion, which, by simply decomposing and absorbing the gases, relieves the distress in a manner which no other known means can accomplish. The remedy is perfectly safe and harmless.

Eruptions of the Face,

When dependent upon debility and constitutional disturbance, are also benefited by the Imperial spring. And considering the strong chalybeate impregnation and the universal favour with which chalybeate remedies are regarded by the *fair sex*,—the use of this water, taken several times a day, as liberally as the digestive powers will admit, confers no little benefit in a variety of disorders dependent upon periodic exhaustion, critical periods of life, and in those eruptions dependent on these or upon a torpid state of the liver.

Spinal Irritation.

No disorder is more prolific in symptoms than this, for they vary wonderfully both in kind and locality, according to the particular tract of the spinal cord that happens to be irritated. Yet, as spinal irritation is often caused by scrofulous* inflammation, and strumous congestion of the fibrous membranes and their prolongations, which form a sheath for the motive and sensitive nerves issuing through the bony tract of the spine, and as it is often connected with concealed rickets, with a reduced state of the blood and irregularity in critical periods, these waters prove, when aided by proper regimen, highly beneficial. To enumerate all the forms of spinal irritation would weary the writer as much as the reader. Hysteria is a com-

* Of which the royal heir of All the Russias lately died (1865).

mon result; a disorder itself comprising a host of derangements; for example—

Indigestion,	Asthma,
Tic Douloureux,	Sciatica,
St. Vitus's Dance,	False Peritonitis,
Colic,	False Gout,
Uterine disorders,	False White Swelling.

But such are a few only of the disorders of *Hysteria* so closely imitating the genuine diseases as sometimes to defy detection, except by the peculiar sensitiveness to pressure, by the suddenness of their advent and departure, or by the results of treatment; active antiphlogistic measures required for severe inflammation, here proving highly injurious. We could perhaps write an amusing chapter by describing the tricks of the nervous systems, which, by some persons of weak resolution, are undoubtedly encouraged both in their frequency and inveteracy. It is a common thing in the female wards of hospitals, to observe hysterics highly *infectious*; a whole hospital ward going off into these marvellous hysterical fits, from pure imitative sympathy with some striking example, exciting the spectators or auditors.

Rhythmical spasmodic movements are a peculiar form of *hysteria*. Some persons roll for hours, daily, like a wheel, or spin like a top, or undertake those portentous motions of the head, sometimes seen in the automaton mandarin-shops. These rollings and gyrations, oscillations and nutations, are, however, distressing enough both to witness and experience. Yet *tonics*, change of air, &c., or electricity, form the chief means for removing these singular affections. Delicate persons who have been thought to have diseased spine and have occupied a sofa for years, some-

times recover under peculiar excitement in an incredibly short space: under electro-biology, for instance, mesmerism, or, we dare say, a finely wrought sentimentalism. The king's evil was assuredly sometimes cured by the royal touch, through the force of the imagination, and why should not a mere hysterical affection of the spine be cured on similar principles? We think, the mental determination of a powerful will produces, in some unknown manner, an influence upon weaker persons, which cannot altogether be denied or explained. Enthusiasm and fanaticism are sometimes thus developed, scarcely by an act of the reason, certainly by a powerful mind acting upon weaker natures. On the same principle, confidence on the part of the patient, powerfully enhances the success of the physician.

CHAPTER III.

THE MONTPELIER SALINE CHALYBEATE.

THE discovery of a saline water which should be free from sulphur, and yet produce an immediate effect, similar in kind to that of the strongest sulphur springs, was for a hundred and fifty years, in Harrogate, a great *desideratum*, especially demanded by an increasing tide of visitors, some of whom, having exhausted the virtues of the sulphureous springs, were accustomed to resort to Leamington and Cheltenham. But independently of these considerations, the Montpelier water stands pre-eminent among all the continental springs used internally, for its rich impregnation with

the *chloride of calcium*, which, indeed, is so rare as to be found in the following foreign watering-places, and in two or three others only :

Chloride of Calcium, in grains per gallon.

Baden.	Ischl.	Baden.	Hall Steyer.	Salzhausen.	Wiesbaden.	Homburg.	Kreuznach.
7	7	17½	33	25	55	77½	132

The proportion of the Harrogate being 159.

If we compare the analysis of the Homburg Spas with Professor Hofmann's analysis of the Montpelier spring, we shall see with how great propriety it might be termed the English Homburg water.—DR. SUTRO has courteously sent, by request, the second Homburg analysis :

HARROGATE.		HOMBURG.	
[Montpelier Saline.		Elizabeth quelle.*	Ludwigs quelle.†
Chloride of sodium . .	657 .	791 .	884½
Chloride of potassium . .	11 .	— .	22
Chloride of magnesium . .	36 7.	77½ .	60
CHLORIDE OF CALCIUM . .	159 .	77½ .	95
Carbonate of iron . .	2½ .	4½ .	4
Silica	1 .	3 .	1½
Carbonate of magnesia . .	42 .	20 .	½
Grains per gallon . .	908½ .	973½ .	1067½

It is also worthy of remark, that the chloride of potassium, a still more rare ingredient than the chloride of calcium, is here also associated with the latter.

The effects, therefore, of the Montpelier spring and the Homburg waters are, as regards saline constitu-

* To this analysis add 101 grains of chalk and 4 grains of sulphate of soda.

† Besides these ingredients this Well contains 2½ grains of sulphate of lime, and 98 nearly of common chalk. It must, however, be remarked that the foreign spring contains a much larger proportion of carbonic acid gas than the Harrogate spring; but there is yet a sufficient quantity to keep the carbonates in transparent solution; when a larger proportion is required we recommend its impregnation with carbonic acid gas by the use of the gasogene.

ents, so nearly allied, that it will doubtless be interesting to learn, from so impartial and distinguished an author as DR. SUTRO, the ascertained constitutional properties of those waters. His remarks, which, with great liberality, he has permitted us to introduce here, will be found in no small degree to verify the suggestions already thrown out in the third part.

"The effects observed at Homburg quite coincide with the properties of the component parts."

"The chief ingredient, chloride of sodium, not only gently stimulates the mucous membrane to an increased secretion, but also loosens the formed and tough mucus, and thus prepares the alimentary contents for elimination, without actually operating as a purgative. Chloride of calcium has been found to act beneficially, in scrofula, being somewhat analogous to chloride of barium in its solvent and alterative effects. It increases absorption in the lymphatic vessels and seems to induce resolution in tumefied glands. The isolated remedy is not so favorably received by the alimentary tube as the sodium salt, being apt to overstimulate and retard alvine functions, if employed in excess. The chloride of magnesium assists the action of the calcium salt. From the circumstance of those springs which contain the greatest amount of chloride of magnesium, particularly increasing bilious alvine evacuations, this salt is supposed to promote the secretion of bile."

"The rapid removal of mesenteric scrofula, by Homburg water, is chiefly ascribed to the presence of these two chlorides. Carbonate of iron increases the tone of the blood, and prevents the development of cachectic liquefaction. It enables the organism to

carry out the reaction by which the penetrating solvent treatment will be succeeded."

"If renal secretion appear, the action of the bowels becomes less perceptible. Sometimes even obstruction takes place in the beginning of the course."

"It must be obvious that one organism will be benefited by imbibition and assimilation of the chemical elements, whilst another will urgently require, for the normal performance of its functions, the removal of tough and impeding materials. Should the watchful physician observe any symptoms of cerebral congestion, he will not hesitate to employ an energetic revulsive treatment by purgatives or otherwise. From two to four tumblers are taken fasting, and ordinarily some fæcal and mucous evacuations take place in a few hours. If they exhibit a serous character, they are not considered favorable, and the dose of the water should be diminished, or dietetic measures taken to change the diarrhœal disposition.

"Three weeks is the ordinary duration of the course; prolongation of this period would cause too great an irritation of the alimentary canal. Towards the third week, the relief experienced at first generally vanishes, abdominal action slackens, the parietes distend, with general lassitude and languor; appetite, sleep, and temper become disturbed. These signs are merely the beginning of critical reaction, and you must exhort your patient not to be discouraged by them. The alterative process has been commenced, repressed piles or catamenia will be reproduced by the reacting effects of nature; hardened fæces, and even gall-stones will be expelled, and the whole repro-

ductive system will often become strengthened after the cessation of these phenomena."

"Homburg has been found very beneficial for aged individuals who have undergone weakening diseases, and who have an instinctive desire for more nourishment, with inactive intestines and a feeling of discomfort after alvine evacuations. The blood seems deficient in certain materials necessary for a proper innervation,* and therefore restoration and cure may ensue by the use of the springs. Experience has shown Homburg to be adapted to a general scrofulous diathesis, without local derangement, and to swelling of the mesenteric glands, with emaciation, and helminthiasis,† to ulceration of the subcutaneous glands, scrofulous blennorrhages of the eyes, or ears, &c. In florid erethic scrofula, the internal use is entirely contra-indicated, whilst in the torpid form, careful employment of Homburg exerts a decidedly curative effect."‡

No one can read these lucid remarks upon the effects of the combinations existing in the Homburg water, without being struck at the decided results obtained by their use; results which, it must be acknowledged, are not easily obtained by artificially compounded drugs. The following observations of the same author would apply, with great propriety, both to the Montpelier spring and the old Sulphur Well:

"The spa is particularly indicated in prevailing venous congestion of the abdominal organs. When scrofulous dyscrasia has existed in youth, mature age

* Vital nervous action.

† Intestinal worms.

‡ The dose of the carbonate of iron here being almost exactly the same as in the Imperial spring, and much larger than in the Montpelier water, this sentence does not apply with the same force.

is liable to venous predominance in the circulating system. Less arterial blood being required now than during growth, when constant organic additions took place, unchanged sanguification, may produce more of this vital liquid than necessary for the renewal of wasted materials. This condition is remedied either by diminishing the quantity of nourishment or by increasing the function of the emunctories. If, however, luxurious meals are indulged in, and abdominal and cutaneous eliminations are checked through mechanical compression, or lengthened sojourn in a confined atmosphere, avoidance of muscular exertion, &c., abdominal plethora must occur, and over-filling and distension of the portal system naturally ensue; the impeded venous reflux impairing the strength of the arterial movement. The blood flows with diminished force, and thus furnishes a less-active stimulus for metamorphic processes. The ganglionic nerves make energetic efforts to counteract this torpidity, and become irritated and weakened in consequence. Dyspepsia, flatulence, irregular stools, colic, headache, mental depression, occasional pains in the back, fullness of the abdomen, and other signs of faulty digestion, torment the patient. This morbid state frequently finds a radical cure at Homburg. Although, at first, the secretion of acid mucus often augments under symptoms of apparent aggravation, they soon yield to relieving evacuations. Gall-stones are frequently removed by the water."

"Melæna and vomiting of blood are often connected with intumescence of the spleen. Such cases find a powerful remedy in Homburg."

"In diseases of *the uterine system*, especially in ab-

normal menstruation, Homburg enjoys a very high reputation, probably due to its powerful anti-venous action. A generally torpid and phlegmatic state is most in need of this spa. In some cases of chlorosis, Homburg will exert a more curative effect than steel springs."

"In conclusion," observes DR. SUTRO, "Homburg is decidedly useful in abdominal plethora, without inflammation or inflammatory tendency occurring after intermittent fever, engorgement of the liver and spleen, and in *inactive circulation of the portal system*, according to the experience of medicinalrath DR. TRAPP."

"But to act healingly, the *Elizabeth quelle* must be well digested, and requires an *uninjured digestive tube*."

CASE VI.—*Induration and Enlargement of the Liver.*

A gentleman resorted to Harrogate, at the urgent recommendation of an eminent London physician, suffering from enlargement and induration of the liver, which no remedies, hitherto employed, succeeded in dissipating. For a considerable period he drank liberally of the Montpelier spring, and had the happiness of being cured of a complaint which had occasioned him years of suffering and anxiety. He always spoke with great admiration of the effect of this water upon his general health.

The cases relieved by this water are generally so similar to those described by DR. SUTRO, that from the concise and satisfactory form in which they are detailed, they deserve insertion here.

"To show the advantageous use of the Homburg water in digestive weakness."

"A lady, confined to her room for more than a year, suffering from complete loss of appetite, furred tongue and obstinate obstruction, which resisted various energetic modes of treatment, at last resorted to the Elizabeth brunnen. The water was found to agree, though obliged to be taken in bed, without exercise. At the end of a fortnight the tongue became clean, and alvine evacuation more regular. In the course of five weeks her digestion was completely restored."

We have no doubt this was a case of mucous dyspepsia so successfully treated by several of the Harrogate waters; the action of the chloridal salts is to dissolve, liquefy, and *detach* the offending adhesions; a process which necessarily proves the source of relief. The mucous membrane, freed from obstruction, speedily regains its normal condition: one of the most common symptoms of this disorder is spasm, or stomachpang, coming on at various periods of the day, and caused by obstructions to the free rythmical movements of the longitudinal, transverse, and circular fibres of the stomach. The older physicians were not unacquainted with this dyspeptic affection, and, with more truth than it has been the fashion of late years to admit, attributed the disorder to cold phlegm on the stomach. We now ascribe it to a secretory disorder of its follicles.

Emetics do not often succeed in the first instance. Small doses of ipecacuanha with rhubarb are beneficial in exciting the movements of the stomach, but are inadequate for removing the cause of the disease, which may persist for years. Heilder records several

speedy cures of this complaint by the Marienbad water, which, from its constituents, is a powerful *solvent*. Dr. SUTRO writes, in reference to the Hom-burg water,—

“An elderly *bon vivant* was suffering from violent and frequent attacks of colic, with obstruction ; he used other spas during ten years, with only temporary benefit, but was only ultimately restored at Hom-burg.”

Nothing exceeds the pain of spasms induced by irritation in any part of the alimentary tube. Considering how fine and thin is its muscular coat, it appears something wonderful that under irritation these fibres should contract with so much force as to occasion intense cramp.*

“Several cases are recorded of ladies affected with frequent paroxysms of ‘cramps of the stomach,’ with alvine obstructions, which yielded after a week’s course of the water.”

“Mr. R., 52 years of age, is perfectly healthy, can eat and drink what he likes, sleeps well, but an intolerable pressure on the pit of the stomach never fails to succeed the meals, with eructations and redness of the face ; he is inclined to diarrhœa. Using the water too freely, pulsation at the pit of the stomach ensued, but reducing the dose and taking it night and morning, and using a sitz-bath for five minutes daily, restoration followed.”

* We know a lady who, from irritation and spasm of this muscular coat (the sphincter recti), suffered agonies of ten hours’ duration, and so intense that death itself was eagerly desired. Her shrieks were audible to a great distance. Chloroform was not then known. She was conveyed a hundred miles on feather beds, placed under our care, and recovered.

We presume these quotations will sufficiently illustrate the *modus operandi* of the Montpelier spring. It must not be supposed that the disorders already named can be exclusively treated either by the Imperial or Montpelier saline chalybeate. On the contrary, so much depends upon temperament or constitution, that sometimes the one or the other spring, used as a tonic and alterative, will be more advantageous. To show the very different effects attainable upon similar constitutions by equal doses taken at intervals through the day, as blood remedies, we have only to suppose two persons, A, B, of similar constitutions, to have each imbibed, during a week, a gallon of the waters respectively. Then comparing the analyses of these springs we can tabulate the results, as follows :

INDIVIDUALS DRINKING.	A.	B.
	(MONTPELIER.)	(IMPERIAL.)
Chloride of sodium	159	657
Chloride of calcium	52	159
Chlorides of magnesium and potassium	61	47
Total alterative salts	272	863
Carbonate of iron	4½ grs., per gall.	2½

A, therefore, absorbs less than one third of the quantity of chloridal salts, with a larger proportion of iron, than B takes ; B imbibes nearly a threefold dose of the most active salt of the whole, the chloride of calcium.

Nor can the difference be made up by A taking a larger quantity in the same time. Suppose he takes three gallons while B takes one, then A will be taking 13½ grains of carbonate of iron, while B takes 2½ ; on the other hand, if B reduces his quantum to be on a par in saline power with A, then B, by taking

the chemical analyses indicate, with the medicinal effects of the Harrogate springs when employed in a suitable manner.

It is much to be regretted that arrangements are not yet completed for employing these waters, as at Wiesbaden, on a large scale for bathing purposes. Objections are raised, indeed, against their external use, on account of the iron deposited on heating the waters in the ordinary manner, viz., boiling them and adding sufficient cold mineral water to lower the temperature to the bathing heat. The plan adopted with the richest steel springs in use at Schwalbach would well apply here. "The baths are heated by steam introduced between the two bottoms of the baignoires (the upper constructed of metal and the lower of wood.)" Doubtless, as at Schwalbach, some iron would be deposited by the heating, but this loss would not interfere with the efficacy of the chloridal salts, which are the chief medicinal agents in the waters. And it is only necessary to reflect on the celebrity of the *Kochbrunnen*, Wiesbaden, to foresee how much advantage might be derived from baths of these springs.

CHAPTER IV.

THE STRONG SULPHUREOUS WATERS.

THERE is no class of remedies which has maintained, both in ancient and modern times, a more steady reputation for definite curative properties

than sulphureous mineral springs. They are distributed throughout almost every quarter of the globe. Authentic testimony is abundantly recorded in favour of their virtues in disorders of the skin, and those diseases more particularly which have originated in obstructed cutaneous functions, and in consequent derangements of the digestive organs.

To Baïæ and its sulphureous waters resorted the Roman citizens, and found relief in rheumatism, gout, and skin-disorders. And two thousand years ago its fame was already *ancient*. At Aix la Chapelle, Granus, a Roman, 53 A.D., discovered its sulphureous springs, afterwards much frequented by the Romans. Destroyed in 451, by Attila, it was again resuscitated by Charlemagne, in 777, who munificently constructed splendid baths, which he used in his levees. His tomb is still shown to visitors. For ages have the sick repaired to the sulphur streams of Lycia, mentioned by Strabo, Seneca, and Livy, and still used by the Turks, according to Humboldt. To Barèges the sick and wounded of the French armies were despatched, and Napoleon commanded artificial baths to be prepared in imitation of its sulphureous waters.

Sulphur, indeed, in a variety of forms, has always been universally considered as peculiarly applicable to disorders of the skin, and to internal diseases connected with them. Accordingly, in all the various sulphureous waters in use, two principal modes of action may be assigned to them.

I. An influence upon the internal skin or mucous membrane, and, through it, upon other systems.

II. A specific cutaneous influence.

The "*continuity of surface*" connecting the external and internal free surfaces of the frame is an expression much used to explain the remarkable sympathies existing between them; examples of which are common in the *eruptions* observed to arise in susceptible persons from certain articles of diet, as shell-fish, acids, damsons, &c.

But the fact of the internal skin or mucous membrane being principally an organ of absorption, and the external skin one of elimination and ventilative discharge, appears a much more probable explanation.

Again, the human skin bears the same relation to the absorbent vessels of the mucous membrane that the leaves of plants bear to their rootlets, both being equally influenced by changes of weather,*—of temperature, pressure, and dampness,—and the fine web-like nervous system of the skin is associated by the closest ties of sympathy with every nerve of the internal organs; these are facts still more explanatory of the intimate reactions between the human skin and the lining membrane of the digestive canal.

With such relations between the external and internal skin it is impossible to separate the cutaneous influence of the sulphureous saline waters from their effects upon the mucous membrane. So that a large proportion of the benefit derived from their use, arises from the inseparable action of these surfaces. We cannot use the sulphureous waters without producing specific effects on the skin and the membrane lining the digestive organs. But the nature of these effects must necessarily vary according to the kind of ingredients with which the waters are impregnated.

* See pp. 55, 56.

Rheumatism, impeded motion in the joints and the nerves, and cutaneous eruptions, were the principal disorders in which, of old, the sulphureous element was a celebrated remedy. During the last two centuries, however, it has been discovered that such waters, in consequence of the new insight afforded by chemistry, might serve other remedial purposes.

Accordingly we find at the different European spas predominant curative powers, suggested by chemistry and accredited by experience, according as this or that particular combination of ingredients is associated with the sulphureous principle.

Thus whilst Aix la Chapelle water contains no other chloride than common salt, but a predominance of the carbonate of soda, and about one third only the total saline strength of the springs in question, and less than one half of the sulphide of sodium, that water displays its powers chiefly in—

Chronic skin diseases,	Gout, paralysis,
Suppressed scabies,	Contractions of the joints,
Chronic rheumatism,	Mercurial poisoning.

Whilst disorders of the viscera of the abdomen, depending on fulness or congestion, find little relief, requiring more active combinations for their dispersion.

The Harrogate waters are peculiarly distinguished for a powerful combination of sulphur with the *four chlorides* which especially tend to relieve congestion of the mucous membrane and digestive organs, and to attenuate, liquefy, and cleanse the whole mass of the blood. They possess, indeed, qualities peculiar to their singular composition, not associated with any other known sulphureous springs. They exhibit, at

once, a stronger impregnation with the sulphide of sodium, and more than treble the amount of saline ingredients than the foreign springs, which are feebly impregnated with the chloridal salts, as follows :

	AIX-LA- CHAPELLE.	WEIL- BACH.	BADEN.	BAELEGES.	CAU- TERETS.	HARRO- GATE.
Chloride of sodium .	207 . .	20 . .	13 . .	3.0 . .	1.4 . .	. 866
Chloride of calcium .	— . .	— . .	3 . .	— . .	1.4 . .	. 81
Chloride of potassium — . .	— . .	— . .	— . .	— . .	— . .	. 64
Chlor. of magnesium — . .	10 . .	— . .	— . .	— . .	— . .	. 55

(Grains per gallon.)

Again, the *Weilbach water*, having the carbonates largely combined with very small doses of the chlorides of magnesium and sodium with twice the sulphureous strength of the Aix water, is resorted to principally for disorders of the lungs, larynx, and incipient consumption, dry cough, hoarseness from mercury—especially when associated with a tendency to hæmorrhoids.

But at *Ems*, the carbonates being again the principal ingredients, sulphur being absent, disorders of the chest, but *without* hæmorrhoidal tendencies, are chiefly suited for the waters.

Hence, by the principle of exclusion, we here detect the influence of a strong sulphureous impregnation in obviating the hæmorrhoidal tendency which, being caused by congestion of the liver or abdominal veins, again shows the specific influence of the sulphur-gas upon abdominal congestion. Indeed, as already noticed at page 168, it exerts a specific influence upon the liver and the circulation of the blood through all the digestive and excretory organs.

Taking, then, into consideration, the properties of the sulphide of sodium, and the evacuant, alterative,

and spanæmic qualities of the various chlorides, &c., we have grounds for employing the strong sulphur-water, for the relief of—

- I. Obstruction and congestion in the alimentary, excretory, and reproductive organs.
- II. Some disorders of the blood.
- III. Nervine diseases.
- IV. Metallic and syphilitic poisoning.
- V. Cutaneous eruptions.

Disorders of the Digestive Organs.

INDIGESTION,—the most comprehensive yet indefinite term used in medicine,—or imperfect digestion, may, of course, occur wherever food is not converted into the proper form for absorption, and may therefore extend through a large portion of the alimentary tube. In the usual acceptation of the word, indigestion is supposed to be limited to the stomach and its immediate appendage or prolongation—the duodenum. But though we cannot say that the strong sulphur-waters are applicable in every form of this complaint we can confidently recommend them in the varieties about to be described as—

Obstructed Digestion, and

Mucous or Follicular Dyspepsia.

Symptoms.—Colic, spasms, weight after food, at one time a craving for food, and at another time aversion, — unpleasant odours and savours in the mouth; heaviness, stupor, or confusion of the mind recurring soon after meals, loss of flesh, lassitude, and

anxiety, sometimes increasing to a feeling of suffocation, great disinclination for all kinds of exertion ; change of temper and disposition, depression, &c. &c. The offending obstructions, exhibit a marvellous variety in form, colour, and consistence. The white of an egg, or its yolk, things resembling bits of wax, suet, shreds of membrane, flakes, macaroni-like fibres—such are the *materies morbi*. Can we wonder at the resulting inconveniences ? We have seen such things mistaken for tape-worms.

We can readily account for the intensity of cramp or spasm in this complaint sometimes affecting the stomach. A lady of our acquaintance, recovering from her confinement, indulged in roast duck and its savoury dressing ; she experienced spasms so terrific as almost to exhaust the powers of life. Dr. Beaumont, who investigated the process of digestion in St. Martin, whose stomach was provided with a strange accidental opening, the result of a wound, ascertained that whenever he introduced the smooth bulb of a thermometer into the pyloric end of the stomach, it caused intense cramp, though not when applied to other parts. The presence, therefore, of obstructing matter often produces cramp and spasmodic effects. The severe paroxysms thus excited, frequently extend to the gall-ducts of the liver. And this explains the bilious or jaundiced appearance often following spasms in the stomach.

Duodenal Indigestion.

The duodenum, so called because it is supposed to be about a foot in length, is really a continuation of

the stomach. Into the duodenum is obliquely discharged the bile secreted by the liver. Besides, then, the inconvenience arising from an obstructed mucous membrane, the plugging-up of the opening by which the bile is admitted, is a disaster of no little moment. A collection of the bile, detained in its receptacle, may, by inspissation, thus, in time, cause *gall-stones*; or, at least, cause a *bilious* state of the system, the bile becoming absorbed into the blood.

In the case of duodenal indigestion, the oppression, pain,—by no means a constant symptom,—and distension, are not experienced in the stomach, but beyond it; not soon after eating, but a few hours afterwards. A curious sympathy has been discovered between the skin and the duodenum. Severe burns on the skin frequently produce ulceration of the duodenum. Several skin-disorders very singularly constitute secondary effects of duodenal derangement.* The sympathy, indeed, of continuous surfaces is well-known, but why the mucous membrane of the duodenum should so remarkably sympathise with eruptions of the skin, has not been ascertained.

The strong sulphur-waters, by dissolving, loosening, and sweeping away obstructions of the stomach and duodenum, thus relieve a variety of symptoms wholly dependent upon retained bile, or mucous indigestion, and cutaneous eruptions which other remedies often entirely fail to remove. We conceive that it is primarily in such forms of indigestion that these waters do such good service.

Both ANDREAL and DE LARROQUE have noticed

* Shingles, lichen, acne, nettle rash, and some scaly diseases, have been noticed in connection with disorder of the duodenum.

various kinds of the secretory disorders of which we speak. "On opening bodies," writes the first of these authors, "one is sometimes struck with a prodigious quantity of mucus on the internal surface of the stomach and intestines. This often forms a thick layer extending over a great portion of the intestine, which, at first sight, might be taken for the mucous membrane itself, and that too, white and healthy. Beneath this layer of mucus the internal surface of the canal may appear in two opposite states. Thus, at the same time that it is loaded with an unusual quantity of mucus, it is itself sometimes of a bright and sometimes of its natural colour, and lastly, at times even paler than natural."*

In the one case, therefore, these false adhesions, while they prevent healthy digestion, sometimes protect a tender and inflamed surface.

This view of the actual state of the stomach forcibly explains, in some cases, a peculiar action of the strong sulphur-water, and accounts for the irritation which sometimes critically follows its prolonged use. So

* M. De Larroque attended a lady under the following circumstances : In consequence of a series of calamities this form of indigestion was established. Pain after the simplest food, producing cough, persisting till vomiting intervened. The greater the pain the more intense was the cough. Besides this, she had nausea, flatulence, uneasiness in the stomach, sudden flushing in the face, and a coated tongue ; constipation and diarrhoea alternated. Sleep was disturbed, the temper morose and irritable. These symptoms had existed for *four years*, with gradual emaciation. Her medical attendants, suspecting gastric inflammation, applied leeches to the stomach, which always aggravated all the symptoms. Blisters, aperients, and various other remedies, were of no avail. At this period M. De Larroque ordered an emetic. She threw up an enormous quantity of bile and mucus ; all the symptoms diminished. In a few weeks, with the assistance of purgative medicines, she was completely restored to health.

soon as the solvent action of the water has dissolved and dispersed the accumulated and adherent coating, the stimulating properties of the saline contents of the water begin to tell upon the newly-exposed and still tender mucous membrane.

Persons suffering from chronic indigestion not unfrequently resort hither, who have gained no relief from *the ordinary measures*. With indigestion has been associated the idea of a weak stomach, which was thought to require tonics; the long use of which has aggravated the disorder, or it has been ascribed to a supposed disorder of the liver, in which mercury in various forms has been perseveringly exhibited. With others, as intestinal torpor has been a prominent symptom, purgatives have been very generally employed, so as, in fact, to become a daily necessity. In some cases we find blisters, and severe embrocations have been freely applied, together with sedatives and soothing remedies, such as prussic acid, henbane, morphia, and soda. In others, a change of action in the stomach has been sought by small doses of rhubarb, ipecacuanha, and aloes; but all these measures, in the various cases alluded to, have failed to relieve the indigestion, because none of them could remove the offending obstructions; while, on the contrary, *remedies* vigorously addressed to their solution and elimination, have given complete and rapid relief, for which purpose the strong sulphur-water is sometimes a very powerful adjunct.

It is a matter of observation that great eaters are commonly ill-nourished, while others, who are remarkable for *embonpoint*, thrive upon comparatively little food. And since an obstructed state of the

mucous membrane causes emaciation, is not the suggestion feasible that many voracious *gourmands* suffer from such an affection as this? Over-feeding is certainly as great a vice as excess in liquors, and fully as injurious. And the penalty inflicted for a sin against Nature "the remorse," as it has been wittily termed, "of a guilty stomach," is, in the end, as keenly felt by the epicure as the drunkard.

In prescribing the strong sulphur-water during many years in a great variety of cases, we have had frequent opportunities of witnessing such consecutive phenomena. There are some who have found very remarked relief in a very few days, but the water then began to prove too active. In others, a much longer time elapsed before the water penetrated the tender surface. But, on the other hand, when there was reason to suppose the mucous membrane was free from a morbid sensibility and congestion, the sulphur water could be taken for months without producing the irritation alluded to.

Nothing, however, can be more rash and indefensible than the indiscriminate use of this powerful remedy in all cases of indigestion. How any professional writer could boastfully propagate the idea, that "where there is excess of action, or any digestive disorder, the sulphur-water of Harrogate is at hand" for general use, it is difficult to conceive.* For the nature of its salts must necessarily interdict its use in many cases of digestive disorder.

Weak Digestion

Is also caused by a deficiency of the gastric juice; the

* 'Harrogate Medical Guide,' by Mr. Smith, surgeon.

essential solvent in digestion. It is capable, indeed, of digesting the stomach itself soon after death; and by the aid of heat will digest various substances in a glass vessel. Without doubt, a faulty, or defective state of the gastric juice accompanies the morbid collections adhering to the mucous membrane. This juice is always deficient in those who eat *too much*.

Common salt, the chloride of sodium, seems to have been intended by nature as a principal means of ensuring the formation of the gastric juice. This simple condiment, found on every man's table by custom, is, however, by many too scantily eaten.

"Salt," says DR. BENCE JONES, "can by no means be considered only as a luxury, but as a substance as essential to life as nitrogenous and non-nitrogenous food and water. Without salt, or some other mineral substance which can be substituted for it, as *chloride of potassium*, no solid substance could be taken into the blood, nor could albumen there be retained in solution; nor could the changes which are requisite for life take place in the tissues; nor could any bile be formed. As hydrochloric acid is formed in the stomach, and soda in the bile and blood, it must be supposed that there exists some power in the body by which the chloride of sodium is decomposed."*

But besides the necessity of abundance of gastric juice, to form which, chloride of sodium is requisite, it is well known that the cleansing-power of salt depends upon its rendering albumen soluble, and it further assists digestion by restraining *fermentation*.—The moment the gastric juice, together with the vital action of the stomach,—which, as Abernethy

* See pp. 142-3.

humorously remarked, "is neither a mill, a stew-pan, nor a fermenting vat, but a *stomach*, gentlemen, a *stomach*,"—the moment the gastric juice permits *digestion* to pass into fermentation, *indigestion* begins.

The brewers use salt to check fermentation, and Dr. BUDD, of King's College, London, gives a striking example of the effects of common salt in preventing, or modifying stomach fermentation. We beg to abridge the case as follows :

"On the 14th of December, 1850, Joseph Burraston was admitted, thin and out of condition, like Lane, and having a stomach-disorder like him." Six months before his admission, vomiting became very frequent and since that time he had sometimes vomited twice or thrice a-day. The appetite was always very good. He suffered no positive pain in the stomach ; but had a burning heat there, and the stomach became blown out with wind. What was ejected was glairy, acid, and fermented with a brownish froth. Various plans of treatment were tried during nearly four months, as follows :

1. Creasote and compound aloetic pills.
2. Dilute nitro-muriatic acid.
3. Creasote, and diet restricted to lean meat, gluten-bread and coffee. By this treatment he gained flesh. But the old complaint returned as before.
4. Emetics of sulphate of zinc. No benefit.
5. Four grains of nux vomica, made into pills, taken three times a-day, without benefit.

"On the 10th of March they were discontinued, and having learned," says Dr. BUDD, "from a man

who was sometime before in the Hospital, vomiting sarcinæ, that he had derived much benefit from eating large quantities of common salt, I prescribed this as a medicine to Burraston. From the 10th of March to the 19th he took two teaspoonfuls, and after the 19th two table-spoonfuls of common salt, in half-a-pint of water, twice a day. Together with the salt he also took, as before, compound aloetic pills to regulate the bowels."

"This remedy proved much more successful than any previously tried. After he took the large doses of salt, he had occasionally a sense of burning in the stomach, and more or less distension; but did not vomit and had very little nausea; and on the 29th of March, three weeks after the salt was ordered, he left the hospital, much relieved. On the 8th of October, the man wrote that, 'his stomach-disorder was very much less troublesome than when he was in the hospital,' and 'attributed his amendment mainly to the salt.'"

"If we may judge by the case of Burraston," the professor remarks, "the fermentation may be greatly checked, and the disorder, in some cases, be much mitigated by large quantities of common salt. A more effectual remedy still, is the *bisulphite of soda*.* It has also been used to prevent the fermentation of animal juices. It owes its virtues to the circumstance that it is decomposed by almost any vegetable acid,

* The *sulphates* are formed of sulphuric acid, and the *sulphites* of sulphurous acid, united to a base, as soda.

Bisulphite of soda is composed of two atoms of *sulphurous* acid united to one of soda.

And the *sulphurous* has one atom less of oxygen than the *sulphuric acid*.

and that its decomposition liberates *sulphurous acid*, which has great power to prevent alcoholic and acetous fermentation." The reader will, we think, agree with us, that these statements are highly explanatory of the good effects experienced in imperfect digestion, accompanied by fermentation, by the use of the *sulphureous* waters, naturally and yet largely impregnated with the *chloride of sodium*.

Nothing is more common than sudden fits of indigestion. The decay, or decomposition, of mucous secretions, acting on the principle of a ferment, rapidly diffuses through the digesting mass in a weak stomach a fermenting property beyond the control of the gastric juice. On the same principle, it is well known that carious teeth are fertile causes of indigestion.

Another form of dyspepsia, capable of relief by the sulphur-water, is one which might be called *muscular indigestion*. The stomach is essentially a motive organ, possessing three muscular layers, transverse, longitudinal, and circular, so that digestion is partly a true act of churning; and just as the peristaltic action of the intestines is carried forward by muscular action of the fibres, so is the food under digestion gradually churned, propelled forwards, by the muscles of the stomach. Each extremity of the stomach, also, is furnished with a muscular valve.* Now, digestion cannot rightly be performed either if the vermicular movements of the stomach are too energetic or too feeble. When they are too energetic the contents of the stomach pass too rapidly through it, or else produce spasm. But if too feeble, then the food, long

* The practice of eating old cheese, to promote digestion, is founded upon its astringent effects on the upper valve.

abiding in the stomach, and favoured by its heat, passes into a state of active fermentation, and this necessarily produces many of the symptoms of indigestion. The stimulating properties of the sulphur-water, by imparting a new action to the fibres of the stomach, when only locally dormant, obviate this cause of indigestion. In fact, it rouses the dormant energies of the nervous centres which regulate the movements of the stomach. But if, on the other hand, their irritability is great, the sulphur-water may invert the muscular action, and thus produce vomiting. It is, indeed, impossible to regard this water as a simple remedy, though it is too much administered as such.

Nervous Dyspepsia.

Whatever exhausts the nervous system, or causes insufficient sleep, or cuts off the maintenance of the blood, or generally fatigues the body, or distresses the mind in the predisposed, gives rise to nervous indigestion. Provided then no circumstances exist which forbid the use of these waters,—in so far as they are found to increase the appetite, the flow of spirits, and the desire for exercise, at the same time that they rouse the whole system to a new kind of action,—they prove salutary in this form of stomach-disorder; at the same time, the change of air, scene, and occupation, greatly assist their operation. In this complaint, a complete holiday, as tending to recruit the nervous centres, is altogether requisite. The accumulation of nervous energy can only be accomplished by increasing the sources of its supply, and diminishing those of expenditure.

Local debility in the stomach is often marked by a sensation of epigastric chill, felt both internally, and externally. The waters taken warm, do good, provided no other symptoms contradict their employment. They rouse the nervous system to greater activity, excite the flagging circulation, and, by the delicate principle of exosmose, attract, through the mucous membrane, copious secretions of the digestive receptacles ; and so, perhaps, increase the supply of gastric juice.

The waters are successfully used also in—

Bilious Affections.

We have only to reflect upon the circumstances which induce these complaints, to admit how numerous are the avenues, and how extensive are the sympathies, through which the functions of the liver are liable to derangement. Unseasonable weather, especially if northerly and wet, greatly predisposes to, and even causes these disorders. Impressions on the nerves, as by sailing, travelling, or unusual movements ; mental and emotional causes, as close study, fear, passion, or terror ; errors in diet, surfeit, new wines and strong ales ; all these disturb, oppress, or spoil the liver. Hence the hard livers of those who live hard.

The very bulk, solidity, and conducting power of the liver renders it peculiarly liable to be smitten by cold. Hence the importance of clothing warmly upon the hepatic regions. A whole legion of ills follow bilious disorders. "Bile and guile," said a well-known authoress, "are the two greatest evils in the world."

We must attempt to notice, generally, those bilious disorders which are adapted for these waters.

In health, the biliary secretion plays a most important part.

“So, in the descending streams, the silver chyle
Streaks with white clouds the golden floods of bile;
Though each nice valve the mingling currents glide,
Join their fine rills, and swell the sanguine tide;
Each countless cell, and viewless fibre seek,
Nerve the strong arm, and tinge the blushing cheek.”

Now the stomach is endowed with a centinel of exquisite sensibility—the valve-like pylorus—which permits nothing to pass that way except the chyme, the first product of digestion within the stomach. But this chyme is very generally acidified by the gastric juice. Here, then, we see the contrivance of Nature, to neutralize the acidity, by alkaline “floods of bile” blending with other juices (as the pancreatic, &c.), and to form a bland, unirritating, milk-like fluid, the chyle, adapted for immediate absorption. Two points, here, also are worth attention. *The biliary secretion being wholly derived from the blood in the liver, is destined, partly, to be absorbed, and partly to act as a natural stimulant to the alimentary tube.** From these circumstances, it follows, that either an obstructed flow of bile, or a diminished secretion of it from the blood, must produce several serious physiological derangements.

FIRST. *By a retention of bile*, no proper chyle can be formed, nor can acidity be neutralized, nor can the alimentary tube receive its natural stimulus. The liver or gall-bladder swells.

(1) The blood is supplied with defective aliments, or crude material, and degenerates. The system becomes oppressed. Languor, the common result of

* Hence the obstructions connected with inactive liver.

superfluities in the blood, spreads over the frame. Lethargy steals upon the muscular system, and morbid feelings upon the nerves.

(2) Acidity, the frequent cause of pain, colic, and diarrhœa, frets the mucous membrane, which, by sympathy, affects the frontal nerves, and causes the brow-ache and head-ache, so characteristic of bilious disorder and acidity. Irritation of the mucous membrane follows.

(3) Deprived of the natural stimulant, the muscular movements of the digestive tube lose their peristaltic rhythm, so significant of tone, and assume irregular, excessive, or irritating actions.

(4) The liver and its biliary receptacle, swells, and congestion commonly results from impeded circulation.

It is easy to understand that these waters may relieve the symptoms attendant upon an obstruction to the flow of the bile, when situated in the duodenum, or caused by a distended transverse colon, or dependent upon abdominal congestion, or a viscid state of the bile.

SECONDLY. *Deficient formation of bile*, a totally different affection, though it produces similar difficulties with regard to the chyle and alimentary tube, has a still more important backward effect upon the blood. If the liver do not form bile sufficiently from the blood, then, elements destined to be got rid of, are left in it. So the blood suffers from deficient biliary discharge and improper nourishment with imperfect chyle. Thus, the deficient formation of bile doubly deteriorates the blood, which becomes heated and acrid, irritates the nervous system, parches the skin, and at the

same time stains it more or less yellow or swarthy.* Hence arise the manifold nervous symptoms. The bilious blood pervading the brain and other nervous centres, excites a morbid irritability, establishes a melancholy or, perhaps, a monomania, and develops an inexpressible weariness, *ennui*, and change of temper, whilst the general appearance betokens some important error in the quality of the blood.†

No organ sympathises more keenly with this state than the skin. It becomes hot, dry, or eruptive. And those who are experienced in liver-disorders know, that so soon as a liver, long inactive in its secretory functions, assumes a more healthy action, the *skin* invariably becomes softer, more pliant, moist, and cool. It requires, then, no great force of reasoning to conclude, that remedies which improve the state of the skin must have a beneficial action on the liver. It is thus that James' powder becomes antibilious, through its influence on the skin : similar effects have mercury, sulphur, and diet-drinks, which promote the perspiration.‡

We have already remarked that these bilious disorders may at any time affect a healthy individual. But they are altogether distinct from *suppressed secretions* of the liver, (where little or no bile is formed, by reason of actual disease), as when its nutrient blood-vessels are obstructed, or its secretory glands indura-

* Many such symptoms also necessarily occur in duodenal obstruction.

† The antecedent and consecutive symptoms of bilious attacks, such as nausea, &c., are so familiarly known as to need no particular description.

‡ At page 166 we are shown how sulphide of sodium becomes soda and sulphuretted hydrogen, the form in which sulphur is freely soluble in water. Chloride of sodium, too, yields soda for the bile, and hydrochloric acid for the gastric juice.

ted, from hard drinking, or exhausted by over-dosing with mercury, or by the habits and climate of the East; or when the blood is inadequate to the task of producing healthy bile, causing that "white livered" state, alluded to by Shakspeare:—

"For Andrew,* if he were opened,
And you found so much blood in his liver
As would clog the foot of a flea, I'll eat
The rest of the anatomy."

Bilious attacks, occurring in healthy persons, soon pass away in general, with a little care and attention. But in those whose constitution is already much disordered, or predisposed, they are more apt to linger. The Indian resident, on his return to the English climate, commonly suffers severely until his system again becomes acclimatised. His liver, formerly over-taxed by stimulating diet, perhaps became disordered for the first time, abroad. He was not aware too, that excessive perspiration and heat were over-stimulating the liver; and that after a certain period, reaction would set in, the formerly over-active liver becoming, by degrees, torpid, when fresh stimulations, by mercury, would further exhaust its powers. We knew a distinguished Indian officer, who, for torpid liver, while there, was three times salivated! Returned to England, *invalided*, exposed to a chilly and damp atmosphere, the East Indian places himself in conditions, at first, decidedly unfavorable to the liver. Whatever measures, then, will freely excite the skin, and efficiently, but gently, stimulate the secretion of bile, prove, to him, of the greatest service. These con-

* "Sir Andrew Aguecheek."

siderations explain the good opinion entertained by many such, of the biliary influence of the sulphureous waters. To them, also, such vapour baths as excite a ready flow of perspiration without a heating or exhausting effect, are of incalculable service; while every means of improving the action of the skin, are attended with good effects.

But a severely impoverished state of the blood renders a course of the strongest waters as inapplicable in bilious derangement, as a mercurial course. It is a common belief that "nothing but mercury will touch the liver at all." And a large number of our visitors, suffering from bilious disorders, have already found temporary relief from preparations of that drug; but they have, at least some of them, experienced that the remedy is worse than the disease. We are aware that it is the abuse, rather than the use, of mercury which is productive of irreparable mischief, of which the now thriving trade of the dentists is only a small exponent. So long as blue pills and black draughts, kept on sale by every chemist, prove a ready charm for temporary bilious attacks, the public ignore or despise the probable penalties hereafter to be inflicted. Abernethy impressively expounded the vast influence of the liver on the general health, and the English are too habitually tenacious to give up any accredited truth. Still, the knowledge—that mercury is apt to remain in the system, as it is absorbed into the blood, when taken in small doses, on Abernethy's plan, and apt to induce torpor of the liver, mercurial rheumatism, and a debilitated state of the skin, no persons being so liable to catch cold as those human barometers sensitive to every change of weather—

and still, also, the knowledge—that like most other medicines, the mercurial dose requires, in time, to be increased,—will at last, it is hoped, deter a thinking public from its frequent use for every slight bilious attack.

Mr. Skey thus expresses himself upon the effects of a mercurial course, in a recent lecture at St. Bartholomew's Hospital.

“Believe me, you cannot get mercury out of the patient's system as easy as you think. Saw a bone in two,—a femur, for instance,—put some mercury in it; and now try to get it all out again,—you cannot do it. In the same way, mercury will remain for years and years, and pervade all the bones.”

“Of the many and many cases I might tell you, as to the evil effects of mercury, I would just mention one. A young lady; a friend of mine, began to ail, very severely, of pain and fulness about the bowels: but a fashionable doctor,—I am sorry to say there are a great many fashions in medicine—pronounced it “liver;” there was a flaw about the liver, and this unhappy, but fashionable young lady, was put under two systematic courses of mercury. Another doctor, or surgeon, called in, ordered strong enemata of turpentine, and all sorts of things; and after clearing out the bowels well she got rid of the liver symptoms and abdominal tumour. But now a new train of miseries set in, worse than the first. She had rheumatism in all her bones, for the first time in her life, and every one of her thirty-two teeth dropped out. We see something like this every week, in practice, so that there can be no doubt of the evil effects of too much mercury. Who cannot see the concatena-

tion of too much mercury—rheumatism, pericarditis (heart-disease), &c.?" *

JAUNDICE commonly arises from pressure, spasm, or obstruction. Duodenal obstruction, from a swelled, thickened, or blockaded state of the bile-duct or its mouth, most frequently causes jaundice; spasm, or spasmodic contraction, or gall-stones next, and pressure from adjacent tumours, loaded colon, &c., are the less frequent origins of the complaint. In many cases it is therefore removed by the waters, but not always. The following, not an uncommon case, illustrates several points which we have already touched upon.

CASE VIII.—*Jaundice of three months' duration.*

A young farmer sought my advice under these circumstances:—The eyes, skin, and complexion exhibited an orange-coloured stain; but the colour, though remarkable, was not of that dark hue which sometimes marks the inveterate form. He had undergone a variety of treatment, suffered little or no pain, and except the conspicuousness of the complaint, experienced no great inconvenience. He was recommended to take, daily, the strong sulphur-water, largely, before breakfast, besides some aperient medicine, and to have a perspirative vapour-bath. He got well in three days. His disorder had lasted about three months.

REMARKS.—This was most likely a case of obstruction of the duodenum, which the solvent and secretory actions of the waters removed, together with spasmodic contraction which the vapour-bath entirely relaxed;

* 'Asso. Medical Journal,' March 29th, 1856.

at the same time that a large elimination of bile from the system was daily effected; hence the rapid recovery. Space permitting, we could describe other cases of bilious affections satisfactorily relieved on the same principles.

Again, connected with the question of the mucous membrane, is the relief to be obtained through it of a congested state of the blood-vessels of all the abdominal organs, and, be it remarked, the whole of their veins pass through the liver on their way to the lungs and heart. When, therefore, the solvent, cleansing operation of the water reaches the true mucous membrane, remarkable effects are accomplished. The fluid part of the congested blood everywhere distributed over the membrane, begins to be poured voluminously into the alimentary tube.* This action, when long-continued, serves at once to effect many distinct objects. The relief of congestion disperses symptoms as many and as various as are the organs affected by it. In this way, palpitation may cease,—the breathing may become free,—giddiness may vanish,—the circulation become equalized,—the oppression of the nervous centres be removed, dropsical effusions disappear. The whole circulation receives a new impetus, for stagnation at any one point in a hydrostatical system of tubes, such as the blood-vessels, influences others in all directions. These and other effects result from mere mechanical relief. And this leads me to say a few words regarding—

* The alimentary tube, in its whole length, measures twenty-five feet, and exposes many square feet of surface.

Plethora of the Constitution.

It is of two kinds : first, when all the blood-vessels are replete with rich blood, the vessels being in a state of tightness and tension ; and secondly, when the blood is too abundant in quantity, yet impoverished in quality, at the same time that the blood-vessels are relaxed. These states, though both constituting *plethora*, are totally opposite as regards their causes and effects. The former more particularly belongs to sanguine temperaments ; the latter state, to lymphatic constitutions. The right application of the sulphur-water must have a very particular reference to these conditions.

The sanguineous plethora constitutes an excess of rich nutriment in the system, which is the exact opposite of watery plethora. No doubt there are many intermediate conditions in which, also, corpulence may be more or less developed ; but an excess of fat, deposited in the cellular tissue, is no sufficient sign of redundancy of rich blood. On the contrary, it is not seldom associated with great constitutional debility and extreme impoverishment of the blood. In fact, a bloated, yet sallow appearance, is well recognised as a serious symptom of approaching disease. It is absolutely necessary, therefore, to distinguish accurately between these states, in order to apply the blood-remedial properties of this water. Our object ever must be, according to the state of the constitution, either to lower or raise the condition of the blood to the healthy standard.

In sanguineous plethora with corpulence, the strong sulphur-water liberally used, during the absence of

constitutional excitement, so as to produce a full evacuant effect, is one of the most effectual remedies we possess, for reducing this state without occasioning constitutional distress. A large number of persons, so conditioned, annually resort successfully to the spa, for this purpose.

It is hardly necessary to remind the reader of the apoplectic tendencies of sanguineous plethora, or of the paralytic results which follow the stroke; yet, it is worthy of remark that we every year see such cases benefited by the use of the water. Paralysis, following a stroke, is caused by a small clot of blood, often not exceeding the size of a pea, remaining in the brain, consequent on the rupture of a small vessel; the absorption of this clot, by whatever means, is followed in general by restoration of the paralysed muscles. It is the alterative, stimulant, and solvent power of the water which must account for the improvement observed in such cases.

On the other hand, a watery plethora, connected with great poverty of the blood, is hardly susceptible of benefit by the sole use of the water.

These general considerations are sufficient to show how far benefit may be expected in dropsical complaints; as

Dropsy

generally originates in the following circumstances:

1. A morbid state of the blood.
2. Impeded circulation, either within the blood-vessels or absorbents.
3. Deficient action of the skin or kidneys.
4. Inflammation.

As it is often connected with two or more of these

conditions, dropsy varies much in its nature and course, and demands a peculiarity of treatment suitable to each. A watery state of the blood, especially a cachectic plethora, obstructions to the circulation of the blood, chiefly in the liver, kidneys, lungs, and heart, and feebleness in the heart's action, are the most common causes.*

So far as dropsy depends upon impeded circulation from congestion in the digestive and secretory organs, and, so far as congestion is removable by the waters, dropsy is very decidedly benefited by their use. Severe organic disease renders them wholly inapplicable, as well as an inflammatory state of the constitution.

Dropsy of the closed cavities, the head, the chest, and the abdomen, if dependent upon inaction of the absorbent vessels, a strumous state of the constitution, and deficient secretory action, may also be relieved.

Systemic Indigestion.

Whenever severe inflammation is about to set in, the digestive powers of the stomach experience complete inappetency. But there are many stages short of the inflammatory. The antecedents of acute disease illustrate all these stages. It is notorious that persons who are living above par, in the indulgence of excessive meats and drinks, are sometimes for years on the verge of apoplexy or an inflammatory attack. But for a time, as the system learns to tolerate ple-

* During many months Mrs. — (housekeeper), a patient of Sir John Fyfe's, daily took the Harrogate sulphur-water (sent in bottles), with a view to relieve her of a scaly affection of the skin and a general dropsical affection. She states that the water had entirely cured her of the latter complaint, whilst it benefited the former. We could find no vestige of the dropsy remaining.

thoric redundancy, as the Armenian girls, for the sake of enhancing their charms, learn to eat and tolerate arsenic, such high livers escape the danger, but when the attack really comes they are noticed to die off more rapidly than the temperate. A mere scratch in such will sometimes cause speedy death.

Systemic Indigestion, or disordered stomach, from systemic oppression, or redundancy of oppressive elements in the blood, is one of the first signals of the constitutional distress, and woe to the subject of it, who, imagining it is merely a weakness of the stomach, flies to tonics and stimulants to recruit, as he imagines, this weakness. By these mistakes, aggravated chronic inflammations are not unfrequently established. It is commonly supposed, and with no little truth, that over-feeding is more injurious than an intemperate glass. The latter produces immediate, the former more remote but not less destructive results. Nothing can remove this indigestion but hard exercise, or blood-depurating treatment. Systemic dyspepsia may, evidently, have as many causes as there are ways in which the blood can be charged with irritating elements. This subject deserves a full investigation—witness the indigestion of carbonized artisans; of lead workers, mercurialized gilders, of blood-fevered patients. The same occurs after severe checks to the action of the skin. We see it in horses, out of condition for want of air and exercise, and from excess of food.

Systemic Indigestion, when no acute symptoms interdict their use, is remarkably benefited by the waters, which, while they reduce plethoric abdominal congestion, also are reputed to cleanse the blood by the increased activity of all the secretions destined to serve

as purifying filtrates from the blood. The sulphureous principle, forming sulphuret of iron from the decaying or worn-out blood-globules, and discharging it from the blood, liberates the system from a redundant oppression. Hence the lightness, exhilaration, and increased appetite so commonly witnessed among those persons with whom the sulphur-water thoroughly agrees.*

Nearly all the old writers on Harrogate insist upon this reducing property; but the cause has not hitherto been propounded. And though this action is especially serviceable in plethoric indigestion, we cannot doubt but it lies at the root of much of the benefit which is experienced from using these waters in a variety of diseases, essentially connected with a loaded, deteriorated condition of the blood. DR. GARNETT, in 1794, excellently alluded to these effects. He says, "The sulphur-water speedily and easily carries off the effects of intemperance, as is experienced every year. Those who have spent the winter in festivity, come to Harrogate with a constitution loaded with impurities, and heated by repeated debauches; but the use of the sul-

* Were it necessary to give full proof of these statements, we might quote the experience of some years in a detailed form. But we feel so firmly convinced of this kind of operation, that we think it sufficient to refer those who wish absolute proof of this point to the chemical investigations of Dr. Heinrich Roth, of Weilbach sulphur spa, as quoted by DR. SUTRO; from which it appears that persons having a tonic plethora, after a time, suffer a critical diarrhoea, by which large quantities of biliary matter, with sulphuret of iron as the colouring principle, are discharged, though no iron had been administered—a phenomenon never observed in persons suffering from an impoverished state of the blood who have no iron to spare. Whence, then, is the iron of the sulphuret, if not from the blood? Sulphuret of iron is a dark green, and when diluted, it forms every shade of that colour. It is unnecessary to detail the similar effects of the Harrogate waters.

phur-water for some time, as a purgative or gentle laxative, not only cleanses the first passages but purifies the blood, opens the pores of the skin, and promotes perspiration; and such patients, though they come heavy and loaded, their appetites gone, and their nerves unstrung, generally return alert, their spirits lively and appetite good."

Systemic Indigestion, or disordered stomach, from unhealthy plethora of the blood, is sometimes mistaken for "a liver complaint," and sometimes for mere local weakness of the stomach. In the first case, the free use of mercurials stimulates, indeed, the liver, but does not remove the deeper cause of the indigestion. In the latter case, as the complaint exhibits a great deal of apparent debility, tonics, nourishing food, the best wines and change of air, are resorted to with a view to overcome the supposed debility, with unsatisfactory results. Under this delusion, that a visible weakness must necessarily require a nourishing regimen, numbers of persons resort to Harrogate, with their health gradually declining under the use of such measures.

Remedies addressed, then, either to the liver or to the stomach merely, fail to remove that vitiated state of the blood on which the systemic indigestion altogether depends. The vitiation results from errors in the two grand processes of animal life, nutrition and excretion. By nutrition, elements are added to the body from the blood. By excretion, the used-up particles are conveyed away. These actions are wholly performed by the minute blood-vessels. For they both nourish and discharge. Too much nourishment, and too little secretion, necessarily causes a vitiated state

of the blood. Indigestion, arising from this general systemic error, is a most common result. It is evident to common sense, that whenever this condition can be recognised, less nourishment and more active blood-purification are the only certain means for altering these conditions. Decayed particles, in a word, demand expurgation.

For this purpose the sulphureous waters present valuable properties. They are essentially blood-remedies. They speed the departure of unwelcome guests, by the various outlets of the frame, especially the skin. And what we consider a strong reason for their lasting good effects, they charge the blood with elements natural to its healthy constitution. Having already, in the Third Part, examined the blood-remedial properties of their saline ingredients, it would be a useless repetition to discuss them further here.

That the symptoms of systemic indigestion may be, and are, often mistaken for liver disorder, is natural, because the living blood sometimes signals its distress by the liver, though quite as often by the stomach. Both liver- and stomach-disorder may depend, then, on the blood-disease; hence the errors and ill-success of mere liver or stomach treatment.

One of the most common signs of systemic indigestion is a permanently quickened state of the pulse, which also resists and rebounds unnaturally under pressure.

The tongue is often clean and moist, the appetite irregular, squeamish, or voracious. The skin is dry, dusky, or sallow and harsh, but sometimes flushed. The kidneys show signs of derangement by various

urinary sediments, whilst the intestinal evacuations are continuously and most obstinately unhealthy; at the same time, decline in strength and flesh is commonly observed.

Colonic Indigestion.

That excessive stimulation necessarily induces torpor is a principle which cannot be too much enforced, as bearing upon longevity and the preservation of health. Nature maintains her balance of power by refusing to act when she demands a state of rest to accumulate power.

In no instance do we more clearly see the melancholy results of ignorance of this simple principle than in the long train of miserable symptoms surely attendant upon the excessive and habitual use of "patent drugs." For this practice principally deranges the *colon*, and by the sympathetic action infallibly induces that form of indigestion which we term *colonic*: a disorder as harassing as it is obstinate, and altogether incurable while the exhausted functions of the colon continue unrecruited.

By excessive stimulation the muscular fibres lose their tone. Then come distension, flatulence, stretching of the delicate nerves, which propagate wave after wave of sympathetic misery. A distended colon obstructs circulation. Giddiness and difficult breathing arise; next the alimentary secretions go wrong; and nervous power, by over-stimulation, is extravagantly lavished away by their expenditure. The nervous powers are, in turn, totally prostrated.

The public, ever ready to exclaim "throw physic to the dogs," seem to regard the use of their favorite

pills as neutral ground, having nothing to do with the practice of physic. In these they indulge, and by these, in due time, they ruin their health in the most innocent and unsuspecting manner possible. Antibilious pills generally contain a portion of *blue pill*, and perhaps always aloes.* The prejudice against leaving Nature to herself in this respect, is founded upon the most plausible theory in the world. Every one believes it and acts upon it very generally. The same fashionable prejudice renders, at length, thousands of persons the eager victims of every new pretender. The invalid who has thus abused the practice of medicine, is ever groping for a new remedy for an old complaint. He is always discovering some new medical star to illumine once more his dying hopes; he beholds but a meteor or an *ignis fatuus*, as delusive as dangerous. Too late learn the victims how greedy quacks can thrive upon intestine wrongs. No medicines are so injurious as those which continually necessitate the use of an increasing dose. A narrative vividly described is on the table, which illustrates the evil we denounce.

A distinguished Oxonian resident acquired the habit of taking a certain pill. He began with *one* weekly, then gradually increased the amount and frequency of the dose to produce an adequate effect. At last he found it absolutely requisite to augment it to *thirty*, as his evening succedaneum. This wonderful feat he accomplished by dissolving them in the fourth part of a teacupful of water, with a resolution worthy of a better cause.

* By rubbing a divided pill on a half-sovereign, blue pill may always be immediately detected by the quicksilver whitening the gold. Aloes, when long used, cause several irritating disorders.

At the end of two years, he says, he had thus swallowed two thousand pills. His memory failed. A veil seemed to be drawn over his brain. Horrible thoughts seized upon his soul (or rather, the horrid drugs had seized upon his brain). He feared to read his Bible. He became useless. His existence seemed a blank, &c., &c. Who knows how much monomania springs from this simple cause alone? A calculation of the consumption of English patent pills, and the profit derived thereby, almost exceeds belief.

The case of a lady has just been detailed to us; following a similar practice, from no other motive than to relieve a sense of depression, she for many months daily swallowed fifty pills. Insanity was induced, and she died in an asylum.

The chief irritation of such drugs being expended upon the colon, which, from its close approximation to the stomach, sympathetically deranges the stomach, colonic indigestion is established. Torpor following over-stimulation is the golden secret which secures an enormous consumption of these drugs. Like the dying drunkard's stomach, over-fired with brandy, the over-drugged digestive tube craves continually for a yet stronger dose. A denial is misery.

The original causes of the inconvenient torpidity alluded to, are briefly these :

1. Inattention to the diet most suitable to each constitution. Sedentariness, too much indulgence in a relaxing warmth.
2. Deficient secretion of bile, the natural evacuant.
3. Deficiency of tone in the muscular fibres of the colon, and diminished supply of nervous energy to sustain the functions of the part.

4. A dry state of the mucous membrane ; deficient follicular secretions lubricating the canal, and excessive absorbing power of the glands of the mucous membrane.
5. A *sheathed* or loaded state of the canal, obstructing muscular and secretory action, especially in the colon.

Without further amplifying these topics, we may observe that the constant use of the finest part of wheat-flour is to be condemned ; the husk or bran contains a large proportion of potash, which is necessary to the health of the blood, and in fact nourishes it. So dry toast, hard, dry meats, and the want of succulent vegetables, stews, &c., are unfavorable to the bodily health.

Many persons resort to the Harrogate waters suffering from the ill-effects of a too free use of acrid and therefore exhausting drugs. When we reflect that the due exoneration of the alimentary canal is a complex vital action ; that no less than four vital functions are possessed by the colon, viz., a muscular progressive movement, controlled by the deep nervous centres, a nervous excitability, a copious circulation of the blood within the mucous membrane, and lastly, peculiar secretions exhaled by its numerous glands, we can clearly understand that the long-continued use of such compounds as we describe, must at length, by over-stimulation, increase the difficulties which they were expected to obviate. After such untoward results, a change from condensed acrid aperients to voluminously diluted saline draughts as presented by the springs, produces very satisfactory relief.

Indeed, it is not surprising that a remedy which appeals to this disorder in a totally different manner should produce a new effect. The sulphureous principle specifically stimulates the muscular fibre, while the secretions, derived directly from the blood, favour a new mode of activity; besides, the solution and removal of obstructions by the waters, promote the renewed sensibility of the deeper nerves. For these, and other reasons, very great benefit of an enduring character is often accomplished in cases of long-standing intestinal torpor with its accompanying sympathetic indigestion. In this way it sometimes removes *sciatica*, a complaint much more frequently dependent on colonic pressure from retained scybalæ than is commonly imagined.

Rheumatism and Gout.

Rheumatism is rather an accidental, gout an hereditary disease. Among the thousands who become rheumatic from east winds, damp, and colds, with every form of the complaint, *gout* affects comparatively a few. It has a special partiality for the extremities and joints, and sometimes alarmingly retreats upon the internal organs. "To live on sixpence a day, and earn it," may indeed cure the gout, but that course by no means guarantees against the rheumatism of cold, damp, and north-eastern gales. The two, sometimes forming an alliance, wage a long and exhausting war upon the constitution, and constitute what is called *Rheumatic Gout*; a most afflictive malady.

Whilst, therefore, the sulphureous waters are

generally deemed specific for rheumatic affections, at least if recent,—gout, being essentially a triple disorder of digestion, assimilation, and depuration, is a more complicated disease altogether than rheumatism. No explanation can be given of *gout* without reference to the blood. The subject is too extensive for discussion here. Suffice it then to say that—

- (1) The deficient play of oxygen within the blood,
- (2) Imperfect digestion and excess of acidity,
- (3) Inactivity of the secretory organs in general,
- (4) Want of air, exercise, and indulgence in a diet difficult of conversion into healthy blood,
- (5) Together with hereditary predisposition,

Are the general causes which promote the gouty diathesis. Nature's principal contrivance for dispersing from the system the useless particles, or *débris* of wasted tissues, is the production of a compound called *UREA*, which is beautifully designed to combine these particles in a form the most perfectly adapted by its complete solubility and neutral quality for rapid, safe, and insensible dissipation. But under the five conditions above noticed, the vital chemistry of the tissues is at fault. For want of the sufficient play of oxygen *UREA* is not formed; but a substance, the true basis of gout, appears, called *uric acid*, which is wholly diverse in qualities from *urea*. It is essentially acid; it unites with soda, forming chalk-stones, and it is less soluble and highly irritating. When, therefore, Nature, intending to form urea, produces uric acid instead, the element of gout is developed. Whatever favours the play of oxygen—as frugal diet, keen dry air, exercise, and bathing in and drinking the

waters—tends to eradicate the gouty accumulations in the blood.*

Nervine disorders.

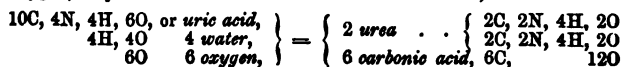
EPILEPSY, depending upon many very different causes, is not generally curable by the waters, or any other remedy, though when arising from any of these conditions already described as suitable for the waters, it is sometimes curable. Example:

CASE IX.—Epilepsy in a lad, combined with Chorea.

S.P—, aged fourteen. Many epileptic fits occurred, commonly twice a week, between June and November, 1852. Movements of the head show an affection of St. Vitus's dance (chorea). This lad was entirely relieved of his fits by the sulphur-water, taken three times a week, after the chorea had been cured by the iodide of zinc. He had no return for two years, when we last heard of him. The tongue was coated and yellow at the beginning of the treatment, and the complexion sallow. He had a very decided epileptic aspect.

* Two points here require further elucidation, viz., (I) That a defect of oxygen causes the formation of *uric acid* instead of *urea*. (II) That uric acid is less soluble than the urea.

(I) Liebig has shown that uric acid, by the addition of water and oxygen, may be transformed into urea and carbonic acid, thus—



10C, 4N, 8H, 16O

10C, 4N, 8H, 16O

(II) Uric acid becomes insoluble in the fluid secreted from the kidneys when the latter is acid; but it is soluble in alkalies. Hence the use of alkaline waters for the eligible dissipation of uric acid, gravel, &c.

*. N denotes nitrogen, C carbon, H hydrogen, and O oxygen.

REMARKS.—The lad improved rapidly under the use of the water, the dose of which was a pint. The course was commenced with a dose of the ricinate and terebinthinate oils, as we suspected intestinal parasites, in which, however, we seemed to be mistaken.

Neuralgia.

Neuralgia receives various appellations, according to the part and constitutional affections associated with it: when affecting the large nerve of the thigh, it is called sciatica. This nerve, issuing from the cavity of the abdomen, is very subject to be irritated by pressure from obstructed lodgments in the sacs of the colon. Hence the peculiar operation of the sulphur-waters, dislodging these matters, in curing pains depending on pressure so caused. The following case of sciatica, though not exclusively cured by the waters, is worthy of consideration.

CASE X.—*Sciatica and Neuralgia of the calf of the leg.* (Duration three years.)

T. Y—, an engine builder, who says mysteriously, “that if he cannot get relief at Harrogate there will soon be an end of the matter,” during the last three years has suffered intense agony, with variable intervals of ease. He states (July 29, 1853), that the pain first came on suddenly in the left thigh, and in three days it reached the calf and front of the leg. He has been under several practitioners, been burnt with hot irons, tried galvanism, vapour baths, and every means of relief which were suggested. Change

of weather and pressure increase the pain, which he describes to be of a sharp, burning, and acutely darting character, and which throws him into agonies of twenty-four hours' duration. The back and chest are sometimes somewhat similarly affected. Walking brings on an intensity of suffering past endurance. As a last hope, he has come to remain a limited time at Harrogate, in great despondency. Directions:—"To drink strong sulphur-water freely, every morning, taking a cordial mixture on rising; to apply aconite ointment to the course of the pain, and to have warm baths of sulphur-water, and vapour bath."

Aug. 19th, reports himself able to walk ten miles with comfort, the pain being quite insignificant, and the general health restored. He now confesses what we at first suspected from his manner, that had he failed of obtaining relief at Harrogate he had fully determined to commit suicide.

REMARKS.—The urgency of the case, and limited visit, demanded the immediate use of every means likely to afford a cure.

Eruptions of the Skin.

Secondary only to the general influence of the sulphureous waters upon the internal skin or mucous membrane, and through it upon the digestive and secretory organs, are their medicinal effects upon the disorders of the skin.

The most exquisitely endowed portion of this surface is the face. Its power of expression, its sensitiveness, its rich supply with nerves and blood-

vessels, and its significant changes in health and disease, altogether render it peculiarly liable to eruptive derangements. Some of these, indeed, are easily removed during their early stages, whilst others prove more refractory, especially after long neglect or exasperating treatment; a principal point for conducting which is a correct determination of the precise characters of the eruptions.

<i>Acne,</i>	<i>Eczema,</i>	<i>Pityriasis,</i>
<i>Sycosis,</i>	<i>Lichen,</i>	<i>Psoriasis,</i>
<i>Herpes,</i>	<i>Erythema,</i>	<i>Lupus,</i>
<i>Impetigo,</i>	<i>Erysipelas,</i>	<i>Syphilides,</i>

Are the chief eruptions affecting the face; most of these, and several others also, attack the trunk and extremities, such as ecthyma, lepra, scabies, pemphigus, furunculus, lupus, purpura, &c., &c.

ACNE principally appears during youth and maturity; but aggravated forms occur at the critical periods of life. There are six varieties; one of which resembles minute black points, which are often imbedded upon a very fair skin; another kind resembles minute boils slowly suppurating; another, a collection of small clustering tumours, which slowly run their course. The occasional severity of the disease is well illustrated by the following case.

CASE XI.—*Acne.*

The subject of this disorder, J. H—, foreman in a rice mill, Liverpool, states that the present affection has afflicted him for two years; that, having sedulously followed, during that time, the advice of

fifteen different medical practitioners, without any success, he has come to Harrogate as a last resource. He has been taking the strong sulphur-water for a fortnight, by medical advice; but he feels, and is altogether worse for the trial. He is weaker, more out of spirits, and the eruption more angry. Present state:—The nose is hideously deformed and enlarged. The cheeks, lips, and chin, and hairy parts of the face, are thickly covered with large, round, slowly suppurating tubercles. The nose, indeed, is rough, knotted or gnarled. Crop succeeds crop of tender, globular, deep-crimson growths, and pitted scars succeed their disappearance. The face is universally reddened, and it smarts with a burning sensation. Ashamed of his appearance, he has left his own neighbourhood to seek employment elsewhere, leaving his wife and children, whom he supports, at a distance.

His spirits are depressed, his strength much reduced, and he feels generally unwell: The blood-globules being much degenerated and impoverished, we persuaded him to adopt a different course; to live generously, taking bitter beer *ad libitum*; to eschew the strong sulphur-water; to drink largely of the magnesia-water, and every night to bathe the whole body with it and white soap. Subsequently he was recommended to drink the Tewit-well water, and lastly, the Imperial spring. In consideration of the severity of his case, and the limited time at his command, the cure was accelerated by external applications, vapour baths, and such internal remedies as experience had taught would expedite the cure of this disorder. The deformity vanished. The rapidly

growing tubercles ceased to rise ; the face healed, and he was no longer to be recognised as the same man. He continues well.

Sycosis is often mistaken for Acne, and also for Impetigo. Experience in observing a great number of cases, and comparing them with the counterfeit diseases, is requisite for their correct diagnosis. They cannot be recognised from written descriptions. We therefore subjoin illustrative examples of relief in preference to giving definitions of skin disorders.

SYCOSIS.—The strong sulphur-waters are not always serviceable in this complaint. Sycosis is the effect of blood-disease, and requires, therefore, suitable remedies, and these are frequently of a directly tonic character. We have found both this and Acne yield very readily to such remedies.

CASE XII.—*Inflamed Sycosis combined with Impetigo, resisting ordinary treatment.*

In June last Mr. B—, having, for six months, been under various but unsuccessful treatment, requested our advice for a tuberculated form of Sycosis, combined with an eruption of impetiginous pustules. He says that he has been ordered spare diet, “to lower the inflammation,” and that he has taken iodide of potassium eight times a day, without relief.

To live well, and take bitter beer plentifully. To entirely discontinue the strong sulphur-water, which he had been directed to take daily, as he is the worse for it in every respect. Pulse being quick, and strength debilitated, and the blood, as in Case XI,

impoverished and degenerated, as shown by microscope, he was directed to drink freely of chalybeate water, taking a preparation of iron with it, a light bitter tonic in the morning, and to use a healing ointment at night. By this plan, the opposite of what had formerly been recommended, he completely recovered. The extreme vessels of the delicate surface of the face sympathising with the general debility, could not assume a healthy action till that debility had been removed; hence the success of the tonic plan of treatment. Sycosis sometimes largely covers the face.

CASE XIII.—*Sycosis*.

A man of the name of Ridal was sent from Sheffield to seek our advice, whose face was, to a large extent, disfigured with this eruption. The upper and lower lips, and the chin even to the throat, so far as the beard extended, were covered with a neglected mass of agglomerated eruption, forming a complete mask of mingled hair and exudation. We recommended him to wash the parts almost incessantly during the day with magnesia water, to poultice with it at night, to drink it during the day as largely as possible, and, as his stay was short, and his means scanty, as well as his health weak, we ordered a light tonic and a sulphureous ointment. We were much pleased to remark, he was completely well, and cleanly shaved, at the end of a fortnight, when he left. Another person shortly afterwards got well with equal rapidity.

IMPETIGO is, according to Bateman, particularly benefited by the Harrogate sulphur-waters, and in this opinion we cordially agree. Impetigo is not contagious.

When Impetigo affects the head it often resembles the contagious Ring-worm, and, when mistaken for it, a great deal of trouble ensues; as the removal of children from school unnecessarily, and interruption of education. Impetigo, so far as it is pustular, resembles also Acne, Sycosis, and Herpes.

Impetigo occurs in figured, scattered, diffused, and also granulated forms. In its general character, Impetigo consists of red, small, distinctly but slightly raised patches, soon covered by pustules, or mattery pimples, which burst on the second, third, or fourth day. The discharged fluid concretes into rough, greenish-yellow incrustations. Example:

CASE XIV.—*Severe Impetigo Scabida of left arm, with excessive and massive incrustation resembling the thick bark of a tree.*

Mrs. G—, cook in a family mansion. An adherent mass was formed by successive crops of the eruption, which completely enveloped the left arm with a cracking, hard, rigid incrustation, in some places nearly half an inch thick. Various means long having been perseveringly employed, Harrogate, as usual, was made a last resource. She suffered intensely. The state of her constitution suggested the sole use of the “magnesia-water.” This she drank largely, and in this she frequently bathed the arm. Her digestive powers were much out of order; we

therefore prescribed a cordial draught early in the morning, and occasionally some aperient medicine. The Impetigo subsided, the incrustation disappeared, the eruption ceased to break forth, the skin healed and became perfectly natural after some weeks' treatment. All other measures had before proved unavailing.

Impetigo is often complicated with *Eczema*, in which case the characters of the latter blending with those of *Impetigo* render the symptoms confused. Besides the pustular eruption, excoriation, ulceration, or discharge of fluid, resembling the serum of the skin blistered by a burn or scald, occurs, as in the subjoined instance.

HERPES, or Shingles, is greatly benefited, in general, by the use of the sulphureous waters. It is sometimes mistaken for *Impetigo*, but runs a very different course. Dr. Garnett relates at some length the successful employment of the waters for this disorder.

CASE XV.—*Eczematous Impetigo of the head, in a scrofulous constitution.*

The eruption, in this case, involved the scalp, the ears, and eyelids. It had endured four years with a virulent obstinacy, under a variety of treatment entered upon in London, Liverpool, and elsewhere. The case was a most discouraging one. The eyelids were everted, reddened, and swelled, and the eyelashes gone.

Incrustations largely covered the hairy regions of the head, and the discharge was profuse. The *Eczema*

of the ears was intense, the general irritation excessive, and the constitution highly scrofulous and weak. Master F— was about ten years of age, and his distressing appearance and hitherto incurable disorders frequently caused his father to shed sorrowful tears. A point worthy of note, as directing the treatment, was this—his brother, with whom he had generally slept, had never taken the disorder. It was not, therefore, the contagious Ringworm, but a severe scrofulous, Eczematous Impetigo.

The boy underwent a course of the waters, applied both externally and internally, took baths, very little medicine, and that of the simplest kind, and completely recovered in fourteen weeks. The citrine ointment was also occasionally applied at night. The next case illustrates another form of Impetigo *figurata*.

CASE XVI.—*Figured Impetigo of face and arms.*

Miss —, from Liverpool, consulted us for an obstinate form of Impetigo, which, being situated in a large patch covering more than one half of the right cheek, had continued sufficiently repulsive to induce her, during twelve months, to seek a variety of advice, though ineffectually. Clusters of suppurating eruptions formed, from time to time, an increasing incrustation of a yellowish-green colour, and of a singular shape; a similar eruption had appeared much more extensively on both arms. The disease had so far proved wholly intractable. We predicted speedy recovery. A six weeks' course of treatment enabled her to leave with a blooming countenance,

which, as well as the arms, was free from any disfigurement.

ECZEMA (Running Scall, Humid Tetter) is both acute and chronic. At all times it is a fierce disorder. The prickly heat, burning, smarting irritation and excoriations and incrustations, its extreme liability to be exasperated by even mild applications and exposure to friction, the long course which it is apt to run, the debility with which it is generally associated, and the frequency of fresh attacks, altogether render it a skin-disorder of a very severe character.

The excessive use of soap, of sand-balls, the handling of various articles in trade, the use of irritating lotions, exhausting occupations or dissipated habits, these and such causes are liable to induce an attack.

There are many kinds of Eczema, some exceedingly moist and others comparatively dry. We see it combined with Psoriasis, with Impetigo, and with Scabies. Chronic Eczema is always accompanied by intense itching, less tolerable, says Cazenave, than the severest pain. The patient loses all his resolution to forbear friction, which invariably exasperates the disorder.

The various forms of Eczema cannot be recognised by a comparison with mere written descriptions or plates. We therefore give only illustrative cases, to which, indeed, our limits confine us.

Cases of Eczema are amongst the most troublesome of the skin-disorders, endure long, and often resist various modes of treatment. Eczema is essentially a result of disordered general health: it is sometimes produced by mercury. We subjoin an illustration of the obstinacy, permanency, and severity which is occasionally exhibited by this disease.

CASE XVII.—*Chronic Eczema of both legs, knees, and thighs, of thirty years' duration.*

Having resorted, on four different occasions, to the waters, this man, a weaver, aged about 52, had never been able to obtain relief from his previous trials here. Nearly the whole surface of the lower extremities, from high above the knees, downwards to the ankles, had an appearance of a general scald from which the blistered skin had been entirely removed. Wrapped up in a variety of bandages, it seemed astonishing that, amidst so much suffering, he could have pursued his trade. He walked painfully by the aid of two sticks. There were some indications of Impetigo, as well as the more general Eczema.

To drink liberally of the magnesia-water during the day, and to take, for a time, the strong sulphur-water, alternate days. To bathe freely with the former water, to apply a camphor ointment at night, and take a little alterative medicine, and wear cloths wetted with the water. During six weeks the treatment was slightly changed from time to time. Our patient threw away his sticks, walked with ease, and regained a perfectly sound skin. He has written several letters, giving satisfactory accounts of permanent benefit, overflowing with gratitude.

The dry form of eruptive diseases is also frequently cured by the Harrogate waters, particularly Lepra, Psoriasis and Pityriasis.

CASE XVIII.—*Lepra. Scaly patches on the arms and trunk.*

More remarkable for the intense depression of spirits which accompanied the disease than for the extent of diseased surface, this case, one of the earliest we treated in Harrogate, surprised us by the rapid disappearance of the eruptions, which consisted of very large and somewhat circular scaly patches and rings of *lepra*, accompanied by considerable irritation. Recommended to drink the strong sulphur-water daily, and to bathe in the mild sulphur-waters, and to keep the parts moist with the magnesia-water, this lady recovered in a fortnight, though her medical attendant, after long treatment, had pronounced her incurable. We ordered a slightly alterative pill, at night, composed of compound colocynth and Plummer's pill. She took no other medicines. She promised to resort again to Harrogate, in case of a relapse, but though some years have elapsed, she has not done so.

PSORIASIS.—Cazenave enumerates no less than seven varieties of this disorder. The worst form is called *inveterata*, and commonly follows the diffuse kind. The amount of scales desquamated in a single night, in this complaint, is sometimes prodigious. Every year numbers of persons are benefited by the use of the waters of Harrogate. The reader will better understand the characters of the severe forms from perusing the next example than by abstract definitions.

CASE XIX.—*Diffuse Psoriasis of the body and head,
with Eczema of the ears.*

A gentleman, sent by a friend at Nottingham, requested our advice under the following circumstances. A profuse detachment of small scales, from a highly inflamed, reddened, hot and irritated surface, was constantly occurring over the whole of the chest, including the back; the eruption had spread downwards from the head along the neck. The line marking the healthy from the afflicted parts was very distinct.

On the head the desquamation consisted of much finer scales, while both ears were surrounded with all the signs of acute Eczema.

The irritation, smarting, heat and tingling, were severe. The night's rest greatly disturbed. Notwithstanding previous medical treatment the eruption had neither abated its severity nor been restrained from gradually spreading. The case was one of Eczema, with *Psoriasis Diffusa*, threatening, as it often does, to become *Psoriasis Inveterata*, so called because it has often been found to be incurable.

He stayed about six weeks at Harrogate, drinking both the strong sulphur and magnesia waters; he bathed frequently, and used both internal medicines and soothing applications. The eruption subsided on the chest, and, as usual in such cases, the head disorder lingered in a milder form, but the Eczema disappeared, and when we last saw him the complaint had wholly vanished.

CASE XX.—*Psoriasis Palmaris.*

The daily use of the Old Sulphur Well before break-

fast, and the almost constant application of the magnesia water, were recommended to a young man afflicted with this complaint, with the best effect. He had been nine months in a general hospital, under treatment. Formerly a gardener under the Duke of Devonshire, he was now totally unable to follow his employment. The palms were *excessively thickened, cracked, and tender*. He could neither completely close nor open his hands. As the stomach seemed to require a cordial medicine, he, every morning, took an early draught of *Beaume de vie* and gentian, as recommended by Sir Arthur Clarke. In about six weeks after the commencement of this plan, the skin of the hand became perfectly natural and free from disease. It was an interesting spectacle to watch the weekly improvement under this simple treatment.

The most distressing complaints to which the human frame is susceptible, are the worst forms of *Lichen* and *Prurigo*. These diseases are sometimes mistaken for a complaint to which disgraceful associations are attached, viz., *Scabies*, whilst the latter, which is notoriously contagious, is sometimes mistaken for the former. *Scabies* is very easily cured by destroying the animalcules on which it depends.

PRURIGO has three varieties. Intolerable itching always accompanies the disease, as its name implies. The eruption consists of very small and sometimes invisible pimples generally of the same colour as the skin, though we have sometimes seen them resemble minute pearls thickly studding the skin. In persons past the meridian of life the irritation when excessive may render life miserable and death itself a welcome

relief. Lichen sometimes accompanies Prurigo, and differs from it principally by having a distinct rash of reddened pimples.

Prurigo and Lichen are essentially distinguished for exalted sensibility of the cutaneous nerves. Lichen, in Eastern countries, is called *prickly heat*, and is compared to the sensation of myriads of red-hot needles pricking the skin. It comes on immediately after eating or taking stimulants, or becoming warm in bed; when, in a state approaching frenzy, the sufferers can find no relief except by plunging into the cold bath.*

The extraordinary duration of Prurigo is sometimes truly astonishing, and the degree to which the nervous system is at last deranged has a corresponding intensity. We abridge the subjoined details from our case-book, which, as the case was progressive, are not devoid of interest.

CASE XXI.—*Prurigo and Lichen of long-standing severity.*

For a period of about twenty years, the general symptoms had been gradually increasing in intensity. Exercise often caused sufficient irritation to induce a fainting fit. During the winters the eruption was

* "From musquitos, cockroaches, ants, and the numerous other depredators on our personal property, we have some defence by night," writes Dr. Johnson, "and in general, a respite by day; but this unwelcome guest (lichen) assails us at all hours. Many a time have I been forced to spring from table and abandon the repast which I had scarcely touched, in order to writhe about in the open air for a quarter of an hour; and often have I returned to the charge with no better success against my ignoble opponent. I seldom could obtain more than an hour's sleep at one time before I was compelled to quit my couch, and if there were any water at hand, to sluice it over me. But this was productive of only temporary relief; more violent attacks frequently succeeded."

always worse, sleep became more and more difficult, and latterly, "during sleep, the heart beat powerfully like the swinging of a bell, fearfully, which always caused a dream of an alarm bell." The long deprivation of sleep exhausted, indeed, the nervous system. "The head seemed dark, cloudy, and enveloped in a universal gloom." Occasionally there was a total prostration of muscular strength "with sensations of imminent suffocation and a whirling of the room; and great difficulty of breathing while walking, even on level ground." She is much troubled with headache, when her pillow "feels as hard as a stone." The general surface is sometimes tender with the sensation of a general bruise, as though she had been run over.

The appetite becomes voracious when the irritation of the skin is at its height. She perspires profusely. The eruption produces a tormenting stinging, resembling innumerable ants in the skin. Of this stinging she complains bitterly. Some eruption of Lichen is distinctly visible.

To allay the nervous irritation we recommended preparations of hop; general ablution, twice daily; large imbibition of the magnesia-water, baths and lotions; occasionally to take the strong sulphur-water, also chalybeates and alteratives. She pursued this plan vigorously, and returned to Harrogate after a short absence. She steadily improved while here, but more rapidly after her departure. Her expressions, regarding her recovery, are now as glowing as her former sufferings were deplorable. She has regained new spirits, renewed nervous power, and declares she "feels new made over again." The treatment was adopted for about three months.

REMARKS.—Long-standing nervous exhaustion, from intense irritation, had induced an excessive sensibility; loss of sleep occasioned general prostration. Judicious bathing allayed her nervous excitement. During her temporary absence, and after her departure, she took small doses of *strychnia*, with great advantage.

These cases, it is hoped, will suffice to illustrate the general characters of some of the skin-disorders. To have given more extended illustrations and more minute details, would have greatly exceeded the prescribed limits. The medical profession, it may be presumed, do not require such details for their information, whilst to the general reader they would scarcely prove either interesting or instructive. We have endeavoured to show that the action of the waters may, in some cases, be facilitated by the use of general medical treatment. We are content to relieve disease in the shortest and most effectual manner in our power, though, by so doing, we may practically pluck away the honours of the waters, for the benefit of the patient.

Thus, as a remedy for that fearful disease, *Lupus*, which so commonly corrodes the face, or so often leaves indelible marks even where it does not destroy, the *muriate of lime* (chloride of calcium) is praised by that celebrated physician, BRETZ, and so *Lupus* may be relieved by the Harrogate waters; it is also benefited by cod-liver oil. But it is more rapidly improved by their combined use. Hence, though it may be more scientific to use the waters alone, it is more humane to employ an eclectic course.

CHAPTER V.

THE MILD SULPHUREOUS WATERS.

THE use of these waters has been so frequently alluded to, and their distinguishing characteristics have already, we fear, been so tediously exhibited in the Third Part, that it must suffice now to observe that, in general, they are used in all those cases where the strongest waters appear too powerful, at the same time that the sulphureous principle is considered to be required instead of iron.

We use them extensively in rheumatism, dyspepsia, gout, diarrhœa with tender mucous membrane, in chronic bronchitis, incipient consumption, and disorders of the skin, kidneys, and liver. Some of them are excellent antiscorbutics, others decided antibilious and tonic, diuretic, antacid, and soothing. Their particular composition is the best guide to their most judicious application.

If our limits permitted, we could detail some interesting examples of benefit obtained by their use. The milder waters are in the end more powerful constitutional remedies than the stronger, because they are more easily absorbed into the blood, and may be taken for a longer period, and in much larger quantities.

The so-called "magnesia water" is serviceable in Chronic Eczema. A young person presented herself for our advice, who from infancy had been afflicted with Chronic Eczema, as described above. As a usual result of this disease, when long continued,

the eyelids were exceedingly red, and denuded of hairs; besides this, the forehead had a corresponding appearance, and the hair generally of the scalp had become very much thinned. Her appearance was both painful and discouraging. At our recommendation she perseveringly used the magnesia-water, both externally and internally, and she was ordered a daily draught of cordial bitters. At the end of two months, having gradually improved, the eyelashes returned, the eyelids and head became free from the chronic inflammation, and her general change of appearance excited no little surprise.

We have cured, also, several cases of Eczema of the hands, by the use of this water, and other adjunctive measures.

CHAPTER VI.

CONSTITUTIONAL INFLUENCE, REGIMEN AND DIET.

A JUST appreciation of the constitutional causes which influence the character and progress of disease in general, and of skin disorders in particular, has a practical importance of the highest moment.

TEMPERAMENT. The nervous, the bilious, the sanguine, and lymphatic temperaments, predispose either the nervous, the secretory, the sanguiferous or absorbent systems, more particularly, to be the seat of constitutional disorder.

Besides these general facts, peculiar conditions, such as—

- (a) *Poverty of the blood, or, on the other hand, Plethora,*
- (b) *A scorbutic habit of body,*
- (c) *A scrofulous disposition,*
- (d) *Hereditary disorders, such as Gout, Indigestion, &c.,*
- (e) *Age and sex,*

indubitably modify the course, appearance, and terminations of disease in general.

According to these conditions, the waters of Harrogate act very differently upon particular individuals. A comprehensive apprehension of these points is indispensable for their most successful administration.

(a) Thus, poverty of the blood peculiarly modifies the course of *Furunculi*, or *Boils*; of *Eczema*, *Ecthy-ma*, and the scaly diseases.

(b) *A scorbutic habit*, always present in Land Scurvy, as well as in the Sea Scurvy, often maintains a given disorder in an intractable state, until the cause is discovered and removed.*

Land Scurvy is not always developed into skin disorders; though some of these are often true results of this state. We are every year surprised at the number of persons who seek our advice, suffering from this unsuspected condition of the constitution,

* A diet too rich and stimulating, as well as depressing passions and the want of sufficient fresh vegetables, and low diet, is known to produce Land Scurvy.

A tendency to exhausting losses of blood, tender, easily bleeding, swollen gums, loosened teeth, bloated appearance, livid spots upon the skin; a difficulty in healing a broken skin; depression of spirits and wandering pains, are some of the symptoms of *Land Scurvy*.

whose diseases had proved intractable, so long as the cause remained unknown.

(c) As for the effects of a strumous constitution upon the course of disease and the advantages derivable by using the Harrogate waters in diseases associated with it, there can be no doubt that benefit is obtained here, in strumous complications.

(d) Persons drinking the waters will do well to reflect how far their present disorders have an hereditary character.

Diet and Regimen.

Habits, and a man is said to be a bundle of them, are wonderful things for affecting the health. How extraordinary, then, is the folly of those who, while seeking a cure, perhaps confessedly difficult, disregard a proper regimen ! How many are the persons who find in change of habits a talisman of relief which no medicine alone could accomplish ! How many such, disgusted with physic and disappointment during the indulgence of a luxurious indolence, start into enthusiastic activity and adopt a total reform under the stimulus of a new idea, and gain a cure as the reward of their own self-denial or exertion ! Such events remind one of the tale of an Eastern despot who, falling sick from a pampered indulgence, commanded his physician to restore his health at the risk of his head. At length, under the influence of terror, the wily man of skill approached his sovereign, and said—"For your majesty's recovery, I have enclosed within the porous handle of this mallet the most costly and exquisite medicaments as a last resource. Daily wield this mallet and strike this ball until the contained

virtue shall penetrate your Royal hand and excite an abundant perspiration. So shall your majesty be restored and your servant save his head." The Caliph regained his health by the sweat of his brow. There is much of this story applicable in the present day. Our patients too fondly believe in the medicated handle, but overlook the weight of the mallet.

We know nothing more hostile to recovery than a disregard of the ordinary rules of regimen and diet whilst undergoing a course of the Harrogate waters. They agree perfectly under certain conditions of the secretory organs, of the blood, and nervous system, but almost every year they produce fatal results by an improper use.

It is a rule even in domestic hygiene, rather to fast than increase the amount of food and stimulants after a powerful dose of medicine. Why then, in the name of common sense, should the drinking of very powerful mineral waters be selected as the opportunity for thoughtless indulgence in the pleasures of the table? Is this giving Nature fair play, who, after all, is the sole curator of "the house we live in?" Why should persons at once over-tax the digestive powers and over-work the delicate mucous membrane? It is not what we eat but what we digest that nourishes the body. LORD BACON, always replete with a fine sense, writes—

"It is a safer conclusion to say 'this agreeth not with me, therefore I will not continue it, than to say, I find no offence of this, therefore I may continue it:' for strength of nature in youth passeth over many excesses which are OWING to a man, till his age.

"Discern of the coming-on of years, and think not to do the same things still: for age will not be defied."

"DESPISE NO NEW ACCIDENT IN YOUR BODY, BUT ASK OPINION OF IT. IN SICKNESS RESPECT HEALTH PARTICULARLY, AND IN HEALTH, ACTION."

"Examine thy customs of diet, sleep, exercise, apparel, and the like; and try, in anything thou shalt judge hurtful, to discontinue it by little and little."

Diet.

In severe skin disorders the diet should be restricted as follows:

BREAKFAST.—Bread and milk, or milk and porridge, instead of tea and coffee;—with or without eggs and bread and butter.

DINNER.—Plain roast or boiled fresh meats.—Fish or poultry plainly cooked, with rice or flour puddings and potatoes, but few other vegetables.

SUPPER.—Milk, or bread and milk, as at breakfast, except eggs. Farinaceous food, tapioca, sago, &c.

In other diseases all stimulating, greasy, rich, highly-spiced food, as creating a false appetite, ought to be avoided. But moderation is the principal rule. It should be recollected that every one's digestive organs can form only a given quantity of gastric juice, &c., for the process of digestion. Therefore, all constant indulgence beyond a certain modicum, becomes a continual source of dangerous accumulations. The votary at the springs should, of all others, remember that he must eat to live, and not drink to eat.

CHAPTER VII.

CONCLUDING REMARKS ON THE ADMINISTRATION OF
THE WATERS.

There are two general methods of taking the waters either first with a view to an aperient effect, secondly to produce an influence by absorption into the blood.

The stronger waters are taken in about half-pint doses at intervals of a quarter of an hour or twenty minutes, either cold or warm, according to individual taste. In some cases it is necessary to precede their use by some aperient medicine for a few days, and continue it during the use of the waters.

I. They produce their best effects when the powers of the constitution are in good force. Thus, after a day of great fatigue, excitement, or a very bad night's rest, after improper suppers or intemperance, the nervous centres do not respond so kindly to the influence of the waters as in a tranquil, fresh, unfevered and unexhausted state. The directions given for the use of the warm bath, at page 107, are well applicable to the drinking of the mineral waters. They should be taken in general before exercise, which very favorably promotes their operation.

II. The absorbent plan, by far the most energetic mode of using the various waters, consists in taking smaller doses frequently during the day, when the stomach is empty, or at all events digestion nearly completed. In some cases both systems are adopted. The mild waters may be drunk very largely, by

practice, and it is then that their full specific effects are developed. None of the waters can be said to be judiciously managed if they produce very unpleasant results, such as head-ache, fulness, nausea, wakefulness, tremor or palpitation. All the milder waters, in general, also pass freely from the kidneys.

It is seldom beneficial for the waters to remain long in the digestive canal. If large quantities remain for many hours undisposed of by the secretory organs, unpleasant results, more or less severe, are commonly experienced.

The absorption of a large quantity of sulphuretted hydrogen into the blood has frequently been known to act powerfully upon the brain as a narcotic; producing also determination of blood to the head. It is thus that the strong sulphureous waters, drunk copiously, but retained long in an improper condition of the stomach, have produced fatal results.

It is most unwise for strangers, from mere curiosity, to drink a variety of waters in succession, at the different springs. The practice ought to be strongly reprehended.

As regards the aperient quality of the strongest springs, perhaps the efficacy, quickness, and painlessness of their operation are amongst the most common causes of their popularity. Taken between 7 and 8 a.m., they do not in general interfere with the business or pleasure of the rest of the day: a circumstance of no little importance.

Bathing in these waters must be conducted upon the principles already discussed in the chapter on Baths and Bathing.

APPENDIX.—PROFESSOR HOFMANN'S ANALYSIS.

GRAINS OF SALINE MATTERS, AND CUBIC INCHES OF GASES PER GALLON.										
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.
	Old Sulphur Well.	Montpelier Strong Sulphur Well.	Montpelier Mild Sulphur Well.	Hospital Strong Sulphur Spring.	Hospital Mild Sulphur Spring.	Starbeck Sulphur Spa.	Montpelier Saline Chalybeate Water.	Imperial Chalybeate Saline Water.	Tewit Well.	Sweet Spa.
Sulphate of lime	182	594	12,104	51,660	1,215	870	—	—	697	307
Carbonate of lime	12,365	24,182	20,467	25,660	19,794	6,960	—	7,604	1,435	2,263
Fluoride of calcium	81,735	61,910	trace.	trace.	—	ft. trace.	159,278	51,629	—	—
Chloride of calcium	55,693	54,667	17,140	11,595	.336	—	35,635	34,027	—	—
Carbonate of magnesium	—	—	?	5,797	10,310	5,390	41,796	—	2,667	3,039
Chloride of magnesium	64,701	5,750	—	10,751	24,970	—	11,383	27,410	1,323	—
Chloride of potassium	—	—	—	—	—	12,207	—	—	1,057	.991
Carbonate of potassa	366,180	803,093	23,413	369,014	220,630	121,798	656,838	158,840	.280	1,543
Chloride of sodium	trace.	—	—	trace.	trace.	trace.	trace.	trace.	trace.	?
Bromide of sodium	15,479	14,414	3,398	7,155	.301	1,711	trace.	trace.	—	?
Iodide of sodium	—	—	—	—	—	5,133	—	—	—	1,338
Sulphide of sodium	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.
Ammonia	trace.	trace.	trace.	1,060	trace.	trace.	2,790	4,627	1,358	.609
Carbonate of iron	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	?
Carbonate of manganese . . . . .	.246	1,840	.165	.535	1,490	1,753	.947	1,450	1,041	trace.
Silica	—	trace.	trace.	1,327	trace.	1,740	trace.	.282	.663	trace.
Organic matter	1096,580	966,450	292,903	484,454	279,046	157,562	908,667	285,869	10,521	10,091
Total	—	—	—	—	—	—	—	—	—	—
Sulphuretted hydrogen	26,900	25,400	5,262	10,898	3,540	2,103	—	—	—	—
Carbonic acid	22,030	14,010	14,280	9,540	10,200	9,260	24,17	19,50	11,85	14,95
Carbonated hydrogen	5,840	.580	.900	.150	5,280	6,150	2,40	5,00	—	.15
Oxygen	—	.480	—	—	1,810	—	.51	—	0,40	.67
Nitrogen	2,910	4,820	7,670	19,780	5,870	4,210	6,48	1,02	5,53	6,35
Total gases in cubic inches	57,680	45,420	28,112	40,358	26,700	20,723	33,56	25,52	17,78	22,12







